ORIGINAL

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

BALLY MANUFACTURING CORPORATION,

Plaintiff/Counterdefendants,

vs.

78 C 2246

D. GOTTLIEB & CO., a corporation, and WILLIAMS ELECTRONICS, INC., a corporation,

Defendant/Counterplaintiffs,

DEPOSITION

of

ALLEN G. EDWALL

CLAUDE W. YOUKER, JR.
OFFICIAL COURT REPORTER
U.S. DISTRICT COURT
UNITED STATES COURT HOUSE
ROOM 1918
CHICAGO, ILLINOIS 60604
312-427-4393

BALLY MANUFACTURING CORPORATION, a Delaware corporation,	)	
Plaintiff/Counterdefendant,	)	
vs.	)	No. 78 C 2246
D. GOTTLIEB & CO., a corporation, and WILLIAMS ELECTRONICS, INC., a corporation,	)	
Defendants/Counterplaintiffs,	)	
BALLY MANUFACTURING CORPORATION a Delaware corporation,	)	
Plaintiff,	)	
vs.	)	No. 79 C 713
GAME PLAN, INCORPORATED, a Delaware corporation, and ASTRO GAMES, INC., an Illinois corporation,	)	
Defendants.	)	

Thursday, October 18, 1979

10:25 a.m.

PRESENT:
MR. KATZ
MR. SCHNAYER

MR. HARDING

(The deposition of ALLEN GENE EDWALL was resumed at 135 South LaSalle Street, Room 900, Chicago, Illinois, as follows:)

ALLEN GENE EDWALL,

called as a witness by Bally Manufacturing Corporation herein, having been previously duly sworn, was examined further upon oral interrogatories and he did thereupon further depose and testify as follows:

DIRECT EXAMINATION (Continued)

BY MR. KATZ:

Q Mr. Edwall, you understand you are still under oath?

A Right.

Q This is a resumption of the deposition from June 8, I believe, 1979.

I refer you to a document which was produced by your counsel under document production number G0006, which is designated on its cover "Service Manual, D. Gottlieb & Company, Solid State Pinball Games, Second Edition."

I ask you to take a look at that document and ask whether you are familiar with it?

A Yes.

Q What is it?

A Well, it is a service manual that describes several facets of our solid state pinball games, the theory of operation, service and repair, and gives certain

wire listings, cable plug connections and parts list and schematic diagrams concerning the said system.

Q And does it represent a description of the operation of the commercial solid state pinball games of D. Gottlieb & Company as far as you know?

A To the extent that it says, yes.

Q Have you ever had occasion to read it or use it?

A I believe I have read it.

Q Did you have anything to do with its makeup or authoring?

A Yes.

Q What was that?

A Various sections I had inputs into, and also proofreading.

Q To the best of your knowledge, is it true and correct with respect to the descriptions made in it?

MR. HARDING: Counselor, would you like him to review it page by page in order to answer that question?

MR. KATZ: Well, I would like him to do whatever he feels necessary in order to answer that question.

MR. HARDING: Well, then, I think you better read the whole thing from cover to cover if he is asking

you if it is true and accurate.

MR. KATZ: To the best of his knowledge.

MR. HARDING: It may take a while, counselor.

MR. KATZ: I do not know that he needs to --

BY MR. KATZ:

Q Do you need to read the thing from cover to cover to determine that?

A If everything in here is accurate, I would have to do that; I would not know any other way.

MR. HARDING: I will allow you to ask him if he presently knows of any inaccuracies in it, if that will help.

BY MR. KATZ:

Q Let me ask that question: Do you presently know of any inaccuracies in that manual?

A At the present time I am not aware of any.

Q Since I am going to be going into certain parts of the manual and not in other parts, I think I will reserve the other question. It may not be necessary to ask him to go through the entire manual.

I would ask, however, that you do read on page II-1, under section II, "Theory of Operation," the part that starts out with the capital letter A, and then says, "Over-all game." It goes four paragraphs.

A (Witness reading.)

I have read it.

Q As far as you know, are those statements true and correct?

A Yes.

Q All right. Now, I ask you to turn to page II-2, under section capital C, which says "Driver Board," and read that section, which consists of five paragraphs.

A (Witness reading.)

I have finished.

Q Are those statements true and correct to the best of your knowledge?

A Yes.

Q Referring, now, to the driver board, can you identify the schematic diagram in the service manual that would correspond to that?

A Yes.

Q And where is that?

A Page VII-12.

Q It is VII-12.

In the second paragraph on page II-2, it says:

"All inputs to the driver board are through edge connector J1 and come from the control

board. The input load data signals LD1, LD2, LD3, and LD4, come into the board through J1, pins 3, 1, 2, and 4 respectively, and are applied simultaneously to the input data ports of all nine ICs."

With reference to the schematic diagram on page VII-12, would you identify those data signals and the particular nine ICs which are being referred to?

A Data signals are labeled as LD1, LD2, LD3, LD4, and the ICs that all of those lines are in common with is Z1 throught Z9.

Q And what components are Z1 through Z9; what kind of components?

A Those are 74175 integrated circuits.

Q And do they have a name or type?

A I believe they are called quad flip-flops.

Q Are they also called latches, as far as you know?

A I believe if you look at the data sheet, they are called quad flip-flops.

Q And how do they operate?

A Well, for any particular circuit within the IC, there are four separate circuits, each one controllable

with a common clock; if you have a high logic level present at the input, D -- in this case let's talk about the first circuit only -- D1, and you clock the flip-flop with a positive going pulse, that input logic level is transferred to the output which is designated as Q, Q1 in our example.

If D input is a low logic level, and you have a clock pulse occur, positive going clock pulse, then you will have a logic low level appear at the output.

Q And is the clock input applied to pin 9 of those integrated circuit devices?

A Yes.

Q On page II-2, it says:

"9 clock signals, DS1 through DS9, enter the driver board through J1 and are applied to the 9 quad flip-flop ICs, Z1 through Z9, respectively. As the ICs are strobed with positive going pulses, any high inputs will generate high outputs to the base of the associated transistor switches and turn them on."

These clock pulses that are referred to, are those applied at the terminals DS1, DS2, DS3, and so on through DS9 in schematic diagram VII-12?

A Yes.

Q Do those clock pulses occur simultaneously?

A No.

Q How did they occur?

A You can have one and only one of those clock pulses present at any particular time that you desire, although there does not have to be any of them present. It is whenever you want them to appear, you put forth the proper commands, and that initiates the particular pulse you want to develop.

Q In the Gottlieb solid state pinball machines, do they occur in any particular sequence?

A No.

Q What determines when they occur?

A The command from the game language, usually, that tells which one to turn on, or ones, in some kind of order.

Q Pardon me?

A In some kind of order, not necessarily the same order every time.

For instance, in your game you might want to turn on lamps 10 through 14 under some condition of a playfield switch being hit; maybe another switch turns on 10 and 12, maybe another one 11 and 13. It all depends on what game you are talking about and which

switch you are talking about having been actuated.

Q And in the Gottlieb commercial pinball games, is that a function of the software?

A Is what a function of the software?

Q The particular manner in which these clock pulses are applied to the respective terminals, DS1 through DS9.

A Usually.

Q Is that determined by what I believe has been called a background program?

MR. HARDING: I am going to ask Mr. Katz to further elaborate if he is going to use the term: Who called it a background program, etc., unless you ask the witness, lay a proper foundation for this witness.

BY MR. KATZ:

Q The term background program and personality program, do those terms have any meaning to you?

A Yes.

Q What do they mean to you?

A The background programming is the programming that resides in either of these two ROMs, the mask ROMs, part number A17xxxx.

The personality program is to be found in the personality PROM that identifies a particular

game, or that desciibes a particular game.

Q With that foundation, I re-ask the question whether the manner in which these clock signals are applied to terminals DS1 through DS9 is determined by the background program?

A Yes, the background program has something to do with turning on the appropriate clock lines.

Q And does the personality program also have something to do with it?

A Yes.

Q What does the background program have to do with it?

A The background program takes the information that was given to it by the personality PROM in the form of a higher level instruction, decodes it; based on that decoding, it sends out the appropriate signals out of one if its GPIOs to a 4 to 16 line decoder, and then that decoder does the necessary decode function on that to output whichever signal the instruction was for.

MR. HARDING: Off the record.

(There was a discussion off the record, after which the taking of the deposition was resumed as follows:)

A (Read by the reporter.)

BY MR. KATZ:

Q Now, with respect to any particular game, such as Cleopatra, for example, would that manner of supplying the clock pulses to strobe the particular flip-flops remain constant with respect to --

MR. HARDING: Would you read the question, please.

Q (Read by the reporter.)

BY MR. KATZ:

Q What I mean is: For all Cleopatras would it follow the same sequence of occurrence?

A For any particular event that you are talking about, yes, it would be the same event in every Cleo.

Q And would it be the same for all of the games, all of the solid state pinball games, such as Countdown, Solar Ride, and so on?

A The same general theory of operation still holds true, yes.

Q Would the sequence of strobing of those flip-flops by the clock pulses be the same?

A Which sequence?

Q Whatever sequence it was, determined by the program.

A I do not understand what you mean.

Q What do you not understand?

A I do not understand what you mean by sequence; what sequence?

Q Well, if the flip-flops are not strobed simultaneously, which is as I understand your testimony, then they must be strobed in some order; is that correct?

A I do not believe that was ever said, yes or no.

Q Do you know, for the Cleopatra game, the manner of strobe occurrence for the flip-flops in response to switch closures?

A Not offhand.

Q What would you need to determine that?

A Program listing for Cleopatra.

MR. KATZ: Wayne, do you know if we have been supplied with a program listing of Cleopatra?

MR. HARDING: I do not know.

BY MR. KATZ:

Q A document that was produced by Gottlieb's counsel under document No. G1400 through G1410 refers to Cleopatra, No. 409SS, but I do not know that that is sufficient for you to answer the question, and I would like to have you take a look at that.

A Is there a question?

Q Can you answer that question from that material?

A Yes, for a specific example.

Q And what example?

A Which one do you want to talk about?

Q Why don't you pick any example.

A How about initialization.

Q Okay.

A In initialization, you are going to set lamp 28, 29, 30, 31, 32, 22, 23, 24, 25 and, depending on whether it is last ball or not, 20 and 21. You are going to turn all of those on in that order, and that is initializiation; that is when the ball goes in the outhole and it is served back up on the playfield.

Q During that part it would follow that sequence?

A It follows that sequence for every initialization; that is the only time it follows that sequence.

Any other sequence is determined by how the game plays and what its particular function, what each switch's function happens to be. Some switches do not turn on any lights.

Q Now, the --

MR. HARDING: Just a second.

(There was a discussion off the record, after which the taking of the deposition was resumed as follows:)

MR. HARDING: Okay. Just because the opportunity presents itself, we would like you to mark your copy of this document confidential.

MR. KATZ: Okay. I will let you mark it.

MR. HARDING: Okay.

MR. KATZ: But I will note that I do not know that I characterized it as software.

BY MR. KATZ:

Q Would you characterize this material which I gave you as a software program listing?

A Definitely.

Q Is the occurrence of those strobe signals on the particular quad flip-flops sufficient to determine the particular lamps that will be illuminated?

THE WITNESS: Would you repeat the first part of his question.

Q (Read by the reporter.)

BY THE WITNESS:

A Assuming that you have a high logic level of the input of a particular flip-flop, then the occurrence of a clock pulse to the clock line, pin 9, of the flip-flop would then turn on the particular lamp.

Q So you need two conditions --

A You have to have a data input and then you

have to have a clock signal to transfer the data from the input to the output of the flip-flop.

Q And what is the source of the data input signal?

A The source of that data is from the control board out of gate 26.

Q And what is gate 26?

A It is a 7416 integrated circuit.

Q What is the name of that type of element?

A It is a hex buffer inverter.

Q And what determines the data signal?

A The same thing that determined which clock pulse was to be sent out, and that is the instruction from the personality PROM for that particular game for that particular action that was just finished on the playboard.

Q During the idle mode of the game when the power is up and the start button has been pressed, but a player has not taken his shot: What would be the order, if any, of the strobe pulses DS1 through DS9? And I hand you, again, this material, the software program of the Cleopatra.

Oh, you have a copy, now, I believe; you can use yours.

A Immediately after the replay button is pushed and the ball is served on the table, I do not know whether it is just before or just after the ball comes to the table, but those lights that were mentioned before are turned on.

The specific DS signals that are enabled would be DS7, then DS8, then DS6, then DS7 again, or possibly DS7 could have been taken care of before, and then, as said before, depending on whether it is last ball or not, DS5 and DS6.

Q Now, once it goes through that sequence to light those particular lamps, and before anything else occurs with respect to the action of the player, does it ever go through that sequence again?

A No, not until something else happens that would call for a lamp to be either turned on or off.

Q So the lamps that were turned on stay on, and the lamps that were off, stay off, until something else occurs --

A Yes.

Q -- with respect to the game play?

A Yes.

Q Now, when the player shoots the ball and the ball begins its journey down the playfield, actuating switches -- let's make that assumption -- what happens

with the strobe signals DS1 through DS9?

A If the ball contacts a switch, and that switch has as part of its control function the turning on or off of a lamp, then the appropriate DS signal, along with the appropriate LD signal for the lamp number within that quad group, both four flip-flops in the package, would then be generated in order to turn that lamp either on or off, and it would all depend on which switch was hit.

Q And would this occur -- would the DS signal and the LD signals be generated immediately after the switch was hit?

A What do you mean by immediately?

Q Well, would it occur as soon as the switch was hit or at some later time?

A Well, at some later time after the switch was hit.

Q And what would determine that time?

A The program written for that switch closure.

Q With respect to the Cleopatra and this program listing that you have, can you give me an example of that occurring and determine the relationship between when the switch closure occurs and the time that the LD and DS signals are produced for defining the lamp illumination?

A I could give you an example, yes.

Q What example?

A Let's take blue drop target.

Q What page are you referring to?

A It's G1402 and G1400.

Q Okay. And what would be the time?

A All right. The ball hits the blue drop target and the blue drop target falls and closes the blue drop target switch.

Q Is there a number for that switch that is shown here?

A I will get to that in a second.

Not specifically.

When that happens, the personality PROM is accessed, and the first instruction that is sent back to the processor for decoding is the instruction -- why isn't it here -- well, in order to -- oh, I see it. It is down at the bottom there.

It would be address 018C. It says "Blue drop target," and then it says "Go to BDT."

Q What page is that?

A The bottom of G1400. It is that last little description. (Indicating.)

The first thing the processor will do

is jump from that instruction to BDT, which is the one located over on G1402 at address 0220.

Now, that "Go to" instruction takes a certain length of time, approximately five milliseconds.

So when you get over to BDT, the first thing you are going to do is copy false lamp 12. Now, that is looking to see if the lamp is lit or unlit, in this case lamp 12. If it is not lit, then I am going to light it, which is the next instruction, "Set true lamp 12." The copy statement has taken another approximately five milliseconds, and then the set instruction is then executed.

So, by the time you get to that "Set true lamp 12," you have spent about 10 to 11 milliseconds. So it would be that length of time before the lamp comes on, if the lamp was previously off. If it was previously on, then you do not have to do anything because it is already on.

Now, that is a typical example of what might happen. In another place you might just set the lamp true right away without copying the state of it. In that case, you would perform your "Go to" and then your first instruction would light the lamp, so that that would be approximately 5 milliseconds before the

lamp turned on.

Q Now, during this period of time, 5 milliseconds or 10 milliseconds, the period between the switch closure and the turn-on of a lamp, are any other switch closures being sensed, or is it possible to sense other switch closures?

A No.

MR. HARDING: Well, I object to the question as being compound, and I do not know which one he answered.

BY MR. KATZ:

Q Which question did you answer?

A I answered the one that referred to whether or not during this 5 to 10 millisecond period that it was in the process of lighting the light or looking to see whether the light was already lit, whether or not any other switch closures were being --

Q Sensed.

A -- sensed.

Q And your answer was "No"?

A Right.

Q Now, if there was a switch closure which required a copy function to determine whether a light was already on -- and let's assume that the light was on -- would there still be a strobe signal generated

for the quad flip-flops, that is, signals DS1 through DS9?

A For the particular example I gave, if the light was already on when it came up to this "Set True Lamp 12" instruction, it would ignore that instruction and not process it; so, therefore, there would be no DS signals or LD signals being outputted in conjunction with that instruction.

Q And would it have received the information that the lamp was already on from some other element in the system?

A No -- well -- could you clarify that, please?

A How does it determine, then, whether a lamp is already on?

A Going back to this example, right when you start the game, this particular lamp is off because it is not initialized to be turned on.

When you hit the target for the first time it will see this copy statement, look to see if it is off; well, it is off the first time, so it sets it. Right when it sets it there, it makes a mental note of that itself, in its memory, that that lamp is on; so, when the next time you come back around to look at the state of this lamp, you have determined it already

because of a previous action on that target.

Q And where physically is that memory?

A That memory is in one of the A-17s, the background ROM, RAM, I/O chips, scratch pad memory.

Q Oh, so that in addition to the ROM which is programmed in the A-17 chips, there is also some RAM function that acts as a scratch pad memory; is that correct?

A There is RAM in the A-17s that is used to store pertinent information based on the program.

Q And that information stored in those A-17s can then be changed?

A Yes.

Q Throughout the game, is that right?

A Yes.

Q The ROM information that is stored in the A-17s, however, is fixed; is that not right?

A Yes.

Q The transistors that are connected to the outputs of each of the quad flip-flops in the schematic of the driver board on VII-12 serve as drivers to the elements which are to be energized; is that right?

A Yes.

Q Is it also correct that some of these transistors

serve as drivers for playfield lamps, and others serve as drivers for solenoids?

A Yes.

Q Are there any other devices that are energized by these driver transistors?

A There are lamps, there are solenoids, and there are two coils, T and Q relay coils.

Q What are those?

A Those are relays on the playboard that control the application of power to flipper, general illumination lamps, controlled lamps, kicking rubbers, pot bumpers.

Q And where are theylocated, the ones that are connected to energize the flippers? Is that shown on this?

A No. It is an indirect method of -- there is a switch on T and a switch on Q relay that, depending on the state of the coil, whether it is energized or not, either make or break a circuit that sends power to the flippers.

Q And which transistors on this schematic are connected to those relays?

A Q1 and 2.

Q Once the driver transistor is made to become conductive by the quad flip-flop, does the quad flip-

flop maintain the transistor in that conductive state, or I should say latch it in the state, regardless of the termination of the input data signals to the quad flip-flop?

A The only way that data can be changed is if you present another clock pulse to that flip-flop and change the information on the input. If it never sees another clock pulse again, the output will never change.

Q The clock pulse is just a transient -- I mean, it occurs for just a short interval and then stops, does it not; it is just a short pulse, is that right?

A Yes.

Q And then when that pulse terminates, the output remains the same in that latched condition; is that not right?

A Yes.

Q And then changes at the input to the quad flip-flops would have no effect on the output until it saw another clock pulse at its terminal 9, I believe.

A That is correct.

Q Now, I would like to have you read the first three paragraphs on page II-4 under the heading "Six Digit Display (Refer to Schematic Diagram)" and tell

me if, as far as you know, that is true and correct?

MR. HARDING: While he is doing that, can we take a three-minute break?

MR. KATZ: Sure.

(There was a brief recess, after which the taking of the deposition was resumed as follows:)

BY MR. KATZ:

Q Could you answer the question that was outstanding, and that is: Is that description, to the best of your knowledge, true and correct?

A Yes.

Q What schematic diagram identifies the six-digit display that is being referred to?

A The one on page VII-13, PB00-D140.

Q It says: "Segment information is received from the control board and enters the display board at J1, pin 7 through 14."

That is the segment information for the digital displays; is that correct?

A Yes.

Q And that is supplied to a component designated Z1, and it says: "Any high inputs will generate high outputs to the corresponding segments of each digit

in the module."

What is the component Z1?

A Z1 is a UDN611A.

Q And what is that?

A It is a vacuum fluorescent display driver.

Q And who manufactures it?

A Sprague.

Q And is it specially designed to drive vacuum fluorescent digital displays?

A It is my understanding, yes.

Q Is it an off-the-shelf item, if you know?

A Yes, my understanding is that.

Q And in terms of its function, does it operate so that whenever any of the inputs 1 through 8 are high, a driving voltage will appear at the output terminals 18 through 11, which correspond to the input?

A Yes.

Q Now, with respect to pins 6 through 1, in reverse order, which have the signals appearing respectively of D1 through D6, what are the functions of those signals?

A Those signals are the digit strobes.

Q And what is the function of those digit strobe signals?

A When you have a logic high on any of those

particular strobes, you will turn on that particular digit segment as based on the segment information that appears at the output of Z1.

Q And those signals are fed to an element designated Z2; and is that also a vacuum fluorescent driver component like Z1?

A Same thing.

Q And the same thing occurs, a corresponding driving voltage will be supplied at the output of Z1 corresponding to the strobe signal D1 through D6 information that was supplied at the input?

A Right.

Q Where do the output signals "a" through "h" of Z1 terminate?

A Where do the output signals terminate?

Q Yes, where do they go? It says "to pins on DS1."

A Okay. They go --

Q Where is that?

A It is the display shown there. "a" will go to all the "a" segments of each of the six numbers, and "b" goes to the "b" segments of all six. They are all in parallel for each digit within the display.

Q And do the outputs D1 through D6 also go

to the terminals of DS1 that corresond to those designations, as shown on the right side of that drawing?

A Yes.

Q With the strobe signals D1 through D6 present, and the segment information signals "a" through "h" present, are those signals sufficient to determine the turn-on of a particular digit display?

A Yes, assuming that the tube itself has five volts, in this particular case five volts AC across its filaments.

Q Are there any other strobe signals which are required to be applied to determine the precise time that that digital display would turn on?

A No. Whatever segment information exists when strobe D1 appears, that is what digit 1 on the display will show you.

Q And it turns on when the strobe signal appears?

A Yes. That digit will turn on when that strobe appears.

Q Now, on page II-4, it says:

"The six grid control lines are enabled sequentially by the processor which also changes the segment information as each digit is strobed. The multiplexing rate makes it appear as if all

the digits are being enabled at once."

What is meant by the six grid control lines with respect to the drawing that we have been discussing?

A D1 through D6.

Q So those are also what we have been referring to as strobe lines; is that right?

A Yes.

Q And what is the sequence of enablement which occurs in the solid state Gottlieb pinball games?

A The sequence of enablement?

Q In other words, the book says: "The six grid control lines are enabled sequentially by the processor," and I would like to know what sequence, what the sequence is.

A Okay. First, the six grid control lines, D1 through D6 -- let's talk about D1 for the moment -- they are not directly enabled by the processor. The processor -- change that -- the GPKD controls the strobe lines. The GPKD gets in the clock information that all the other chips get, or most of the other chips get, and internally sets up the configuration that is required to put out digit strobes. Those come sequentially and at certain time intervals, regardless of what the

processor is doing.

So, for any point in time the GPKD will take the clock signals and send out a pulse on D1, give you a short time of blanking where nothing is active, then put out a pulse on D2, then D3, then D4, all the way down the line, and by means of gating that is performed in the control board, we send out 16 different strobes.

Whereas the GPKD has basically 8 strobes, we use a data bank select signal to double that figure into 16.

So it puts out 1, then 2, then 3, down to 16, and then it starts back over at 1 again, 2, 3, and it continues that and does that the whole time during when the game is on and the processor is -- I should say and the GPKD has a clock signal coming to it.

Q And it is regular in its cycles; is that right?

A Yes, it is.

Q This diagram just shows D1 through D6; where would the other ten be shown? Are they shown on any other diagrams?

A Yes. In order to get that information -- the drawing that shows that clearly is the one on VII-6. On connector A1J3 are listed the D1 through D16 signals,

besides the power.

Q What are the other outputs from the GPKD, the other outputs than the strobe, the sequential strobe signal that we are talking about?

A The other outputs are Y0 through Y7 which, in this case, are all pulled up to a high -- I should say they are pulled down to a ground, they are not being used; you have the X0 through X7 signals out which ultimately generate D1 through 16; you have got a DBS signal, which is the data bank signal, which selects either bank strobe 1 through 8, or 9 through 16. It is how we develop 16 strobes from 8 outputs; and then you have the data information for bank A, and then the data bank information for group B, such that you are able to drive 32 digits of displays by having two separate groups of A and B, in this case segment information latches that are built internally into the GPKD.

Q Does the segment information come from the GPKD also?

A Yes, it does.

Q And that segment information comes from the microprocessor, is that not right, to the GPKD?

A Yes, if you take it all the way back.

Q Now, during the sequential strobe operation,

as the GPKD provides the strobe signals D1 through D16, is the microprocessor free to perform other functions?

A Can you clarify that, please?

Q Since the GPKD is controlling the sequence of the strobe signals which it generates for the digital displays, is it true, then, that the microprocessor is free to perform other functions?

A When the microprocessor is not updating display information, changing a score, changing number of credits, whatever is being displayed, then it is free to do whatever it wants to.

The GPKD will handle all the segment outputting and digit strobe outputting by itself, has no need to have anything to do with the processor.

The processor only becomes involved when you are updating a number, when you are changing a number.

Q Now, if a digit number remains the same, and even though the information is not changing, that digit will be continuously turned on and off by the strobe signals, but will maintain the appearance of being on; is that correct?

A Yes.

Q On continuously?

A That is correct.

Q With respect to the two paragraphs on page II-4 headed "Four Digit Displays," are those two paragraphs true and correct to the best of your understanding?

A Yes.

Q And do those four-digit displays operate in essentially the same way that the six-digit displays operate?

A The theory of operation is the same, yes.

Q And are the strobe, or the digit strobes, enabled sequentially by the processor?

A The four-digit display works with digit strobes 13, 14, 15, and 16, and they are a part of the complete cycle of digit strobes as previously explained.

I should correct that. It is not 13, 14, 15, and 16; it is 7 and 8 and 15 and 16, but the operation is still the same.

Q So, for a game such as Cleopatra, there would be four six-digit displays and one four-digit display; is that right?

A That is correct.

Q And that is the total number of digital displays?

A Four six-digit and one four-digit is our normal configuration on a four-player game.

Now, I ask you to read on pages II-4 through II-7, the description of the control board, the CPU, memory, and I/O devices, general purpose input/output devices, and general purpose keyboard and display control device, and tell me whether the description is true and correct to the best of your knowledge.

A (Witness reading.)

Yes.

Q Can you point out the schematic diagrams that are referred to in connection with that description of the control board?

A Pages VII-8 through 10 -- yes, through 10.

Q Referring to page VII-8, which is drawing PB00-X101, what is the element Z23 in the upper left-hand corner of the diagram?

A Personality PROM.

Q And is that a plug-in element?

A We put a socket in our control board such that the person is able to plug it in, take it out, without the need of a soldering iron, the PROM, that is, not the socket. The socket is soldered in.

Q Where are the A-17 background program chips shown?

A Page 9, U4 and U5; and I think on page 10, too,

there is -- no, I am mistaken. I thought that there was another part of them shown there, but it is not.

Q U4 and U5?

A Yes, they are shown both on page 9.

Q A-1753CX and A-1752CX, is that right?

A My book shows CE and CF respectively.

MR. KATZ: Could I see his book?

MR. HARDING: (Indicating.)

MR. KATZ: It is different.

BY MR. KATZ:

Q I notice that your copy bears a copyright notice on the back cover, copyright 1978, and ours also bears copyright notice 1978.

I do not see, really, any distinguishing characteristics between the two, but I do note that there is a different designation. Is it possible that perhaps the witness can explain the significance?

MR. HARDING: Sure.

BY MR. KATZ:

Q Do you know why, in mine, the drawing for U4 and U5, which is PBOO-X101, and has the latest revision date of February 1, 1978, shows that these U4 and U5 parts are A-1753CX and A-1752CX respectively, and it differs from yours?

A Yes.

Q What is the explanation?

A The X refers to -- that last letter refers to a revision level on the chip, X meaning, denoting that something should appear there, but not necessarily the latest revision; E and F are the latest revisions of those chips that we are using.

So yours is a more generalized part number which could denote any A-17, either 52 or 53, whereas my book shows what is the latest revision for those two devices.

Q Is your book later, more recent than the one I have?

A I do not really know. There is no real way of telling.

MR. HARDING: It seems that this one is more informal and this has been formalized --

BY THE WITNESS:

A Well, that is what it is. This was taken more or less off of a schematic, and then when it was sent over to the printer's, it was typeset and everything else, and now this is appearing in a block diagram type, or block lettering type of thing, whereas this is handwritten, reproduced off of a schematic.

BY MR. KATZ:

Q The one that I have.

A Right.

Q So you think it would be reasonable to conclude that mine may be an earlier version of yours?

A Thatis not really -- cannot really say.

MR. HARDING: Mr. Katz, you do have the G0006 document in your possession, however; is that correct?

MR. KATZ: I do not know. I would have to refer to my co-counsel, Mr. Schnayer, to check to see if we have it. I have been working with this other one, assuming that it was the same.

BY MR. KATZ:

Q Now, are these background program chips, U4 and U5, also plugged into connectors?

A No, they are not plugged into sockets --

Q They are soldered?

A -- they are soldered directly into the board.

Q I ask you to compare, since you are familiar with these schematics, ask you to compare the circuits, or the designations in your book with mine, briefly. If you note any apparent discrepancies -- I should say differences, between the two, any other differences, I would like to have you note it.

MR. HARDING: The entire book, Mr. Katz?

MR. KATZ: No, no, just these three figures for the control board.

MR. HARDING: Couldn't this be best done over lunch or something?

MR. KATZ: Okay, yes, we can do that over lunch.

And, in answer to your question, you did produce document G0006.

BY MR. KATZ:

Q Now, with respect to the three sheets of schematic that describe the control board, would you describe the operation of sensing switch closures in the Gottlieb solid state pinball games?

MR. HARDING: I am going to ask Mr. Katz to be a little bit more specific on his question.

BY MR. KATZ:

Q Well, with respect to the switch matrix, which is shown in part on page 3 of 3, VII-10, and also on page III-22: Is that specific enough, if the witness can answer the question?

MR. HARDING: To expedite the description, I am going to allow just a broad question to get the discussion started.

I guess that is all you wanted, anyway; is that correct?

MR. KATZ: That is correct.

MR. HARDING: A broad statement.

BY THE WITNESS:

A What would you like to know?

BY MR. KATZ:

Q The answer to the question.

A Can you tell me your question again?

Q With respect to the switches shown on page III-22, and also on page VII-10, how does the system sense switch closures?

A Well, first of all, those two drawings do not have anything to do with each other, so I guess you will have to be more specific.

Q Okay. Is there a playfield switch matrix in the Gottlieb solid state pinball games?

A Yes.

Q Is it depicted in this book?

A Yes.

Q And where is it depicted?

A III-22.

Q With respect to those playfield switches, how does the system detect switch closures?

A The microprocessor will cause, on page VII-9, will send outputs from U5, pins 8, 7, 6, 5, and 4, strobe 0 through S4, what we call strobe 0 through strobe 4, those signals from the output of the A-17 are inverted by integrated circuit Z8, and sent out of the control board to the playfield.

The drawing on page 22, III-22, then shows how the strobes are connected through diodes, through playfield switches, and back into returns.

Those wires designated as returns come back into the control board at ports J7, pins 10 through 17, into the integrated circuit Z9 and Z28, where they are inverted, and then back into the A-17. The processor then takes that information and then performs an analysis on it to see if in fact any switches are closed, have been closed,or whatever.

Q And where you talk about integated circuits Z9 and Z28, on my book it just says 9 and 28.

A Well, mine does not show Zs, but the standard notation, as far as I am concerned, for denoting an integrated circuit, not an LSI device, is a Z number; so, you are correct, mine do not say Z9 or Z28, or Z8, but --

Q But those are the inverter symbols?

A Yes.

Q So the output strobe signals S0 through S4 are produced from -- I should say are provided by the background program chip A-1752 through the respective integrated circuit inverters that are designated 8, right?

A Yes.

Q Now, are there more than just those five strobes?

A No, not for the playfield matrix.

Q There are five strobes for the playfield matrix only, right -- only five strobes for the playfield matrix?

A Yes.

Q And are there any other strobe signals produced to sense switch closures?

A Yes.

Q And where are they shown?

A On page 10, VII-10, there is a switch matrix there which is used to detect the state of certain operator adjustable switches which are physically located on the control board that an operator may set according to his desire for number of coins, for number of replays, three-ball, five-ball, match, in or out, and so on and

so forth, as described in our operating manuals.

These are the siwtches that he can control to make the game suit his particular location, as far as how it plays with respect to those features as listed in the operating manual.

Q And that matrix has three columns; is that right?

A Well, as shown, they are written like columns, if you want to call them that.

Q And there are three strobe signals?

A There are three signals labeled as DS0-bar, DS1-bar, DS2-bar.

Q And what are those signals?

A Those are signals that are sent in to activate the matrix and fed back in through Z27 and Z29, back into U3, that enable the processor to determine which switches are closed and which ones are open.

Q And what kind of device is U3?

A U3 is a GPIO.

Q And would you refer to the signals, DS0-bar, DS1-bar, and DS2-bar as strobe signals?

A They are the counterpart to the S0 through 4 signals; the S0 through 4 signals being the ones that go to the playfield switch matrix, and DS0 through -2-bar are

the signals that are concerned with the operator adjustable switches.

Q Where are they generated?

A They are generated from the integrated circuit Z30, over to the left on the same page. (Indicating.)

They feed up there.

Q And what kind of device is Z30?

A 4 to 16 line decoder, 74154.

Q And it says 14 to 16 data strobe generator, on the bottom.

A Well, yes.

Q You have some reservation about that designation?

A Well, the 74154 is a 4 to 16 line decoder. In this particular application, since we are generating DS signals, it has been called a 4 to 16 line data strobe generator, thus the signals become DS, standing for data strobe.

Q And with respect to the particular signals, DS0-bar through DS2-bar, those three data strobe signals, what order of occurrence do they fall?

A DS0 is generated, then DS1, then DS2, when the operator parameter matrix must be interrogated as to what conditions exist on the switches.

Q And when is that?

A Those switches are interrogated when you start up a new game by hitting the replay button; and, during the -- well, shortly after power-up, before the game is ready to be played, it scans those switches when you turn power on. It is in the power-up routine.

Q And then, once the power is on, it only does it when the start button is pushed, or reset button?

A Yes, when you reset a game; not every time the button is hit, but just when you are starting a new game.

Q Does it ever occur in response to coin insertion?

A No.

Q And when it goes through this sequence, does it only do it once and then stop?

A Yes.

Q Now, with respect to the strobe signals S0 through S4, provided by the background program chip U5, what manner of occurrence do they have?

A For which, under what conditions, under what game conditions?

Q Under the power-on condition and nothing else.

A Power on, game just sitting there idle?

Q Well, you say power-up, I believe.

A Well, power on.

Q Okay, power on.

A The game is just sitting there?

Q Sitting idle, yes.

A When the game is just sitting there with power on, not in a game condition, then those strobes are coming -- well, strobe 0 comes, is active, then strobe 1, then strobe 2, then strobe 3, then strobe 4, then strobe 0.

Q Does that continuosly cycle like that, assuming that you are in the idle mode?

A Assume you do not do anything, yes, it will repeat itself.

Q So it just follows that normal sequence, and then recycles and continues to do that?

A Yes.

Q Now, when you push the reset button to start a game, and you have not done anything else, does this continue to occur?

MR. HARDING: What is "this"?

BY MR. KATZ:

Q Does this sequential and cyclical occurrence of the strobe signals S0 through S4 occur?

MR. HARDING: I am going to object to the

characterization. I do not believe there has been any testimony of that as being cyclical.

MR. KATZ: Well,okay.

BY THE WITNESS:

A When you hit the replay button, depending on the nature of one of the operator-adjustable switches, the outputting of these signals may or may not be momentarily interrupted.

MR. KATZ: Could I hear that answer back.

A (Read by the reproter.)

BY MR. KATZ:

Q What is that operator-adjustable switch?

A It is the switch that controls the replay tune, the playing of the replay tune, upon hitting the replay button.

Q Oh, but that can be engaged or disengaged?

A The operator could set it to either play a little tune or not to play a little tune.

Q First, let's say it is set not to play a tune: Then, would these strobe signals S0 through S4 continue to occur in the sequence that you described?

A Yes.

Q So it would be S0, S1, S2, S3, S4, and then S0, S1, S2, S3, S4, and so on?

A Yes, but maybe a point of clarification: There is, on coming out of J75, a signal that it says "not used," but there is, in effect, a signal there. We are just not using it.

Q To do anything.

A To do anything. So it would be -- it acts almost like an S5. So if you understand that, then the answer to your question is yes.

Q Okay, so there would be S0, S1, S2, S3, S4, and then S5, but you do not use it --

A And so we do not mark it on the schematic.

Q And then it would repeat.

Now, if it does play a tune, what would occur?

A The generation of any strobes would be momentarily halted while that tune is being played.

Q So that would be all stop.

A It would all stop for the duration of the tune.

Q Then it would resume?

A After the tune was completed.

Q Now, after the reset button is pressed, a ball would be ejected to the shooter, right?

A Under normal operating conditions.

Q Now, during that occurrence, would this sequential strobe signal that you described still continue?

A The ball is served up to the table by means of a solenoid being actuated; likewise, too, that little tune that is being generated upon the replay button closure, is also in effect a solenoid closure.

Anytime in the process, in the course of a game, whenever a solenoid is being energized, those signals are not present any more on those lines during the duration of the time that those solenoids are energized. So once the solenoids become energized, everything goes dead on those lines.

When the solenoids are de-energized, then the lines are energized again in the manner that was described before: S0, S1, S2, S3, and back.

Q What determines the timing of these strobes?

A Well, the microprocessor does that, and the program that tells it what to do.

Q And is there some clock signal that maintains them as a regular sequence?

A Well, a typical strobe is shown on III-44 under paragraph H. That is a typical strobe with a typical pulse width.

Q Now, does that pulse width remain constant

for each of the pulses?

A First understand that this waveform that is shown is an active low, so when it goes down to 0 point baseline, is when it is in the active mode.

The width between the first section and the second section, if a strobe is there, that is what it will look like. You can consider this drawing as being one cycle, one cycle meaning like a sine wave, you know, one complete cycle. It shows the whole strobe on time, there.

Q The first portion of it seems to be narrower than the second pulse; is that not right?

A Yes, that is the way it will appear.

Q And this would be a strobe, let's say strobe S0.

A It is typical of any strobe, S0 through S4.

Q And when would the next strobe occur after the one shown here?

A It depends on what is going on.

Q In the idle mode.

A Approximately every 18 milliseconds; which is to say that 18 milliseconds after this, assuming that you are in the idle mode, that you get an identical figure as this. That is what I meant by one cycle being

shown in this drawing.

Q Okay, so the strobe pulse is not actually a single pulse.

A No, not as shown here.

Q And when you say strobe 0, it actually goes to a low for a certain period of time, goes to a high for a certain period of time, goes back to a low for a certain period of time, and goes to a high for the remaining portion of that cycle?

A Well, when it goes to the high for this last time, that is when S0 is done. S0 starts here; S0 is done here. (Indicating.)

Q Oh, before -- I see.

A Starts here and then ends here, and now it will be high until the next one comes.

Q And so the latter part of this graph on III-44 represents an interval between strobes.

A Yes, the latter part of it, the last three divisions.

Q So if you had the next successive strobe occurring, it would occur after the three divisions on this graph.

A Yes, it would happen after that. (Indicating.)

Q What is the purpose of having this particular strobe configuration, strobe pulse configuration, if you

know?

A Which particular configuration?

Q Strike it.

Is there any reason that you know of for strobing or generating the strobe pulse in this particular manner?

A No, not as shown here.

Q What function does it serve to have the pulse essentially broken into two portions, a first portion and a second portion, as depicted in figure 5?

A I do not know.

(There was a discussion off the record, after which the taking of the deposition was resumed as follows:)

BY MR. KATZ:

Q Do you have any understanding as to what the purpose of having the pulse go high and then low again?

A No.

Q Do you know who would know?

MR. HARDING: Do not speculate.

BY THE WITNESS:

A I do not know.

BY MR. KATZ:

Q Do you know who designed the system to generate

a pulse of that configuration?

A The pulse is produced because of instructions in -- well, I should say this wave train, and I assume that is what we are talking about, pulse, the whole thing, is produced by a series of software instructions.

And, as mentioned, I think, previously, Don Harmer was involved with writing the software.

Q And he wrote it in a manner that caused that particular wave train for strobe pulses?

A He was involved with the writing of the software, and it is my understanding that his software produces that waveform.

Q Is it of any significance as far as you know in connection with the operation of this pinball control system?

MR. HARDING: I object to the question. Is what of any significance?

MR. KATZ: This particular waveform that Harmer caused to occur in the system by his programming.

MR. HARDING: A given strobe waveform?

MR. KATZ: Yes, this particular one shown in figure 5.

BY THE WITNESS:

A The answer is, I do not know.

BY MR. KATZ:

Q Now, referring to Figure III-22, during the idle mode these strobes, S0, S1, S2, S3, S4, would occur in a sequence in that order; is that correct?

A In the idle mode, strobe 0 is followed by strobe 1, is followed by strobe 2, by 3, by 4.

Q Okay. Now, during the period of strobe 0, what operations occur to determine whether any of the switches in the first row of the matrix have closed?

A The microprocessor will execute instructions which will enable it to look at the input ports on U5, and those are designated as zero with a slash in it, phi-8 through phi-15. Those are the ports of U5 that are, through an inverter, interfaced to the, what are called the return lines on the opposite side of the switch.

Q And does that occur in any sequence or simultaneously? Does that occur simultaneously with respect to each of return phi-8 through phi-15?

(There was a discussion off the record, after which the taking of the deposition was resumed as follows:)

BY THE WITNESS:

A I do not recall.

MR. HARDING: Would you repeat the original question, now.

(The record was read by the reporter as requested.)

BY MR. KATZ:

Q And your answer is you do not know.

A No, the answer to the question was I do not recall.

The second part -- there was a second part of your question.

Q Is whether they occurred simultaneously.

A Yes, your question stated whether I knew whether it was done sequentially or simultaneously, and I do not recall.

Q You do not recall?

A Right.

Q Is it possible to tell from that program listing on the Cleopatra how that is accomplished?

A No.

Q Is it possible to determine from any documentation how that occurs?

MR. HARDING: Are you asking whether he knows of any documentation that he can refer to?

MR. KATZ: Sure, right.

MR. HARDING: Rather than have to --

MR. KATZ: Any documentation, of course, that he is aware of, and he is now looking in the manual.

BY THE WITNESS:

A The operation of the A-17 chip as described in a specification sheet for that device lists 16 input-output ports for this device; they can be input or output, depending on how you program your commands.

They are individual and distinct one-bit ports; therefore, it is impossible, physically impossible, with the device to program it or set it up to read anything all at the same time.

So in answer to your question concerning whether the states of these lines, phi-8 through phi-15, whether or not they are read all at the same time: No, they cannot be because of the architecture of the A-17 device.

BY MR. KATZ:

Q And then how are they read?

A Whether or not they are read sequentially which was the other part of your question, I still do not recall that aspect; and in trying to think of what might give a clue to that as far as other documentation, I cannot think of where it would be that I could look that up.

I do not know.

MR. HARDING: it is 12:35, Mr. Katz.

MR. KATZ: Let's recess for lunch.

MR. HARDING: An hour?

MR. KATZ: Let's start again at 1:30.

(Whereupon a recess was taken herein from 12:35 p.m. until 1:30 p.m. of the same day, Thursday, October 18, 1979.)

BALLY MANUFACTURING CORPORATION, a Delaware corporation,

Plaintiff/Counterdefendant

vs.

D. GOTTLIEB & CO., a corporation and WILLIAMS ELECTRONICS, INC., a corporation,

Defendants/Counterplaintiffs.

No. 78 C 2246

BALLY MANUFACTURING CORPORATION, a Delaware corporation,

Plaintiff,

vs.

GAME PLAN, INCORPORATED, a Delaware corporation, and ASTRO GAMES, INC., an Illinois corporation,

Defendants.

No. 79 C 713

Thursday, October 18, 1979

1:30 p.m.

PRESENT:

MR. KATZ
MR. SCHNAYER

MR. HARDING

(The deposition of ALLEN GENE EDWALL, was resumed at 135 South LaSalle Street, Room 900, Chicago, Illinois, as follows:)

ALLEN GENE EDWALL,

called as a witness by Bally Manufacturing Corporation herein, having been previously duly sworn, was examined further upon oral interrogatories and he did thereupon further depose and testify as follows:

(The record was read by the reporter as requested.)

DIRECT EXAMINATION (Continued)

BY MR. KATZ:

Q But they are not read simultaneously, that is clear; is that right?

A That is right.

Q Does the pinball control system contain any provision for eliminating erroneous response to switch bounce, to your knowledge?

And by switch bounce, I am referring to the playfield switches in the matrix shown on page III-22.

A My understanding is that the debounce is controlled by the generation of what we call the strobe signals, that whatever bounce is in a switch is -- well, the time between two strobe pulses, the same two strobe pulses, is such that that takes care of most of the bounce on the switches on the playfield.

In other words, if all things are equal, and you have one event occurring, and then nothing for a while, that the next strobe pulse after it gets done processing the first one is 18 milliseconds later, roughly, and that that time in between there, the switches would have to bounce for longer than that period of time in order to be recognized again as closed switches.

Q When you say two strobe signals, you are talking about two successive strobe signals like S0 and S1 --

A No.

Q -- or are you talking about the two parts of the pulse that we saw in the waveform of figure 5?

A I am talking about the generation of a strobe, S0, and then until it is generated again, the same strobe.

Q Oh, I see, until S0 in the next cycle.

A Yes, the next time it comes around.

Q Do you know of any other provision for handling or dealing with switch bounce from the playfield switches other than what you have just stated?

A Not that I am aware of.

Q Do you know if there are any provisions in the program to deal with switch bounce?

A I do not know.

Q Now, with respect to reading each line of switches in the matrix on the return lines, what would determine the order in which the return lines were read?

A The software.

Q And is that the software in the personality program or in the background program?

A The background program.

Q Could you tell from looking at a program listing of the background program the order in which each switch return line was read?

A It is possible I might be able to figure it out, given enough time.

Q Have you ever seen a program listing of the background program?

A Yes.

Q Who wrote the background program for the Cleopatra?

A My undersanding was Don Harmer.

Q You did not?

A No.

Q Did you write the background program for any solid state game of Gottlieb that is commercial?

A That we sell commercially?

Q Yes.

A No.

Q Would the background program for the Cleopatra be the same as the background program for the other commercially sold Gottlieb pinball games?

A Basically.

Q Would it differ in any material respect as far as you know?

A We went through a revision or two in the early part of it, but I do not recall what each of those revisions did in the way of changing the program.

Q When the system detects a switch, a particular switch closure, what occurs?

A Well, the information on that switch matrix position is transferred to -- well, there is a spot in RAM that designates each switch according to where it is on the matrix; that particular location, then, is set to show that the switch has been hit, and the microprocessor then will -- well, will exercise the personality program for that switch position, go through its instructions, and then perform those instructions, and then clear up the memory location that says that the switch has been closed, and then go on looking for other closed switches. And that is a basic overview of what happens.

Q And does the microprocessor clear the RAM every time there is a switch closure?

A No.

Q As I understand it, there is a RAM, random access memory, that has an address that corresponds to each switch in the matrix; is that right?

A There is a map in the RAM that has a location designated as its counterpart in the switch matrix, yes.

Q Okay, and when a switch in the matrix is closed, that information is stored in that memory at that location corresonding to that matrix position of the switch; is that right?

A Yes.

Q And when that occurs, the microprocessor then reads the memory to obtain that switch closure information; is that right?

A Yes. If it was doing something else at the time, it would have to have a need of storing another switch; if it read that a switch was closed, it would store the fact that it was closed, and get to it and process it as soon as it got freed up from whatever it was doing, namely, processing a different switch.

Q And is it correct that the system would not

sense any other switch closures until it had dealt with the requirements of this particular switch, that it had already been sensed and store in the RAM?

A No, not, that is not true.

Q Well, then, assuming that we sense one switch in a row, wouldn't the next step -- I think we have established the next step would be that that switch closure information was put in to the corresponding position in a RAM; then what would happen next?

A Depending on what the microprocessor was doing, it would process that switch or another switch or, you know, whenever.

For instance, if it was in the middle of doing something else with respect to a switch, and another switch happened to be closed, and if it recognized it, then it would store the fact that it had been closed, and when it got done with the first switch, it would start doing all the other switches that it sensed were closed by this information that was residing in the RAM.

But if nothing was being done when it sensed this switch, it would go right to that switch location and start processing. In other words, it depends whether or not you were in the middle of something else

or whether you were sitting there and something happened and you could go right to it.

Q Then it is not true that once it senses a switch closure, it finishes up the routine required by that switch closure before it would do anything else?

A I think we are all -- I think we are -- I do not know where we are right now. I think we had better go back and clarify what situation we have and start over again, because right now I am not sure what your question is with respect to recognizing a switch, processing a switch, looking for other switches.

Let's start all over for everybody's clarification.

Q Okay. Let's assume that we have a strobe, S0, and during the on time of that strobe, there is the interrogation of the return lines from the S0 row of the matrix, and we detect a switch, 60, that is closed. Okay?

A Okay.

Q At that point, when it is detected, does the strobe S0 stay on, or will that -- can you describe what happens at that point with respect to the strobe signal S0, the return line 6, and so on?

A Let's take a specific example of what you

are referring to that might clarify and answer what you want.

Using Cleopatra as a model, let's talk about the center target switch, okay. So the ball has hit the switch, and now what happens?

Okay, let's assume first that the microprocessor was sitting there more or less in the idle mode, such that it was not doing anything when that switch was hit, okay. The switch is hit, and what happens is that the microprocessor recognizes that; the switch is closed, and then goes into the PGOL routine, the program. Okay? It interrogates the PROM, and starts doing these instructions.

It goes to this first page, and says "center target switch," which says, "go to CTG." Okay? So that, then, directs it to go to location 02FD, and it starts performing what it is supposed to do.

The first statement is a copy statement to see if a lamp is either lit or unlit. If it is unlit, it is going to score 500 points; if it is lit, it is going to score 5,000 points, and then it is going to stop, and that stop means that now that switch has all been processed and that is all there is to it.

Now, in the course of performing these

instructions, the strobes that are coming out of S0 through 4 are not -- let's put it this way: They are not being put out any more, except during a score instruction. Okay?

So that means when it performs the "go-to" instruction, or this first copy instruction, that there are no strobes being sent out on the lines, and there is no interrogation of return lines which, what that means is, during the time, if a switch should close during that time, the microprocessor will not recognize it. If the switch closes during a score instruction -- now this is another switch, not the same switch -- if it does it during a score instruction, then the microprocessor is putting out strobe signals and can recognize that another switch has been closed. And, since it is in the process of performing the instructions for this switch, it puts a mark in memory for that other location so that when it comes back around to that memory, it can see that a switch has indeed been closed.

And so the same thing is true for all of these instructions, the sets, the copies, the toggles, the flags, all of these: There are no strobe pulses being generated when you are performing those instructions; that makes it also true for solenoids, which goes back

to what I said before, that when a solenoid is energized because of an instruction, that you cannot read any switch closures because there are no strobes being put out.

So, what that means, then, is that the strobes, if you were to put your scope probe on strobe 0 and look at it, while the game was being played you would see strobes coming, you know, one right after another if nothing was being done; but if things were happening, you would see irregularity to when those strobes came. And, likewise, because of that fact, if a ball, like hits a pot bumper and scores -- now, remember, that after every score there is a solenoid set, because you have to ring a chime; and these first games, Cleopatra had chimes, they did not have the electronic sound board stuff; but it is the same principle for those, so it does not make any difference whether you are using one or the other.

When this score is taking place -- let's say the pot bumper gives you 100 points -- you update the display, put 100 points up there, but then you have to ring the chime at the same time. Now, in the process of ringing that chime, you set a solenoid true which lasts about 45 to 50 milliseconds.

During that time, it does not matter what the ball is hitting, the microprocessor will never look for returns because it is not putting out strobes; is it involved in delaying so that this chime is being energized for that period of time. So if the ball hits a pot bumper, gives you the score and then goes and hits another switch, like goes up a rollover or something, within that 45 to 50-second window, that microprocessor is never going to store the information in its RAM that anything was ever hit, simply because there are no strobes at that point in time.

It is only when you have these score commands that the strobes are re-initiated when it is in the PGOL, the foreground, the personality program instructions that a switch can be recognized.

Now, after it is done with this and gets to a stop, then it goes back into its idle stage, assuming that nothing else has been recognized, and keeps going until something else, indeed, has been tripped, and it goes off and performs that function.

Q Now, after it reaches a stop, would the interrogation be of the next return line for the same strobe?

A The interrogation is more concerned at that point of looking at the RAM -- well, in addition to

that, looking at the RAM, also, to see if it has anything left over from before. Because if you have hit two or three things while it was processing one, you would have to take care of that, and it goes back and does that as soon as it can.

Q And you would only know that you hit those other two or three things during the scoring of the preceding item, that it was --

A During the score command of a preceding switch actuation.

Q Okay. Now, during the scoring of the preceding actuation, would there be an interrogation of the next switch in that same strobe row?

A Well, when you say "next," I do not really -- I cannot really answer whether it is the next one; but the process of looking for closures is initiated again during the score instruction, so that on a five count, which would take, you know, like 500 points, which would take normally about a quarter of a second, you do not want to lose any potential switch closures in that quarter of a second, that is too long a time to wait, so you have to go back and look to see, interrogate your matrix to see if anything has indeed or is happening, and that is what happens: It updates its information on the

RAM during the scoring pulses when it is in, you know, the foreground program routine.

Q Now, when it is updating, it will somehow sense the rest of the switch closures in that particular row before it is done with that strobe 0, though, is that not right?

A Yes, it will -- it works on a strobe, looks at everything on each of the returns for that strobe, and then goes to the next one and the next one and the next one, until it goes off and accesses, you know, another location in here for another --

Q Okay. So that in your description -- well, let's say we have strobe 0 occurring, and three switches close in that line, and we sense, let's say, one of the three, and then you say it goes, it interrogates -- puts that information in the RAM, and then interrogates the personality program, and then does the things that it needs to do, and during this period strobe S0 is off, and the switch matrix is not being interrogated; and, let's say, it results in a scoring function, scoring operation. And, during updating the scoring, the S0 strobe might come back on again, and the return would sense the second of the three switches and put that in the RAM and go through the same thing, and then during

the scoring of that, pick up the third one, which would require the S0 strobe to come on again and put the third switch of that row into the RAM and run through the same thing with S0 off.

Now, if that is true, then the strobe S0 would have come on, let's say, three times; is that a correct statement of the operation?

A Not really, because you are talking about something that happens very quickly as far as software is concerned, it is able to execute a lot of instructions in a small amount of time, versus the time that a switch could be closed; it could recognize at any time during when that switch is closed, in order to get a valid closure, either the first part of it, the middle, or the last, it does not make any difference, as long as it does it when that switch is closed.

Whether it happens in that kind of time sequence that you just described, or happens all at the same time because these strobes go a lot faster than the ball can hit a target, close it, and move away from it, is something that, you know, you cannot say whether it is -- whether it happens that way most of the time, some of the time, all of the time, because you just do not know. It is a time-dependent thing

that, if you close two switches at the same time, how do you really know whether it has processed the strobe 0 the first time, and then picked it up on the second time through after it has done a little bit of the first program, or whether it did it almost instantaneously, because -- you just do not know. There is no way of telling when it does it.

But what you describe could happen. Whether it happens like that most of the time or as a normal situation, again, it is a time-dependent thing that you do not know, because you cannot see those short intervals of time.

Q But, would the strobe S0 occur repetitively like that without having already gone through in between S1, S2, S3, and S4?

A Oh, you are saying three successive S0s before it went S0, 1, 2, 3, 4, 0, 1, 2.

If it managed -- if all these switches closed, and if 0, the first one, was closed and stored, and then in the process of running through the rest of the returns on that line, if one of these other switches was after it, then it would pick it up right then and there; if it was before it, it would have to come back around--

Q You would not see it until the next time S0 came up, right?

A Yes.

Q Okay --

A But S0 is not necessarily stopped after just one pass through. It all depends on what is in here, and-- (Indicating.)

Q Oh, sure, but what I am saying is, assuming in the situation that you were describing where you have more than one switch closure in that S0 row --

A Yes.

Q Let's say there were two switch closures -- would both switch closures be put into the RAM before the strobe S0 was turned off and the microprocessor went off to read the personality program and go do the, go through the routine required by those switch closures.

A The answer to your question is that if a switch happens to close just after that strobe has finished looking at its return line, then it goes through S1, 2, 3, 4, before it gets back to it.

There is no, what you would call, let's say, an interrupt type of thing such that no matter where the strobe is at one point, it automatically quits what it was doing right at that instant of time and

goes someplace else.

So if you call that like an interrupt type of set-up, then we do not -- there is not one like that that exists in our system. If you close it just after or just -- well, I -- do you understand what I said?

Q I understand what you are saying. But I am still looking, I guess, for the sequence of events that occurs when you have two switches which are, in fact, closed during that strobe, say, strobe S0 --

A Yes.

Q -- and their return lines are not sensed simultaneously, so let's say one has to occur before the other, and --

A Okay, are we assuming, now, that the first switch closes and then starts processing, and then the second switch closes, what happens with the strobe signals? Is that what we are talking about?

Q Okay, let's take that case: First the strobe signal is on, it is at 0, and one switch in that row closes, and you sensed it on the return lines, and we went through --

A It would start through this, and then if that other siwtch closed during a score instruction -- because that is the only time when strobes are being put out.

and the returns interrogated -- then it would store that information in the RAM, and when the processor got done with that first switch, it would then process the second switch.

Q What strobe would come back on?

See, the strobe went off when he was processing the information from the first switch, and it was sometime later, now, when you are done with that routine from the first switch, that you are coming back to display the score; and during that time, the second switch is still closed, because this is all happening very quickly.

A Right.

Q I mean, this scanning is very fast compared to the switch movements, I assume.

Now, does the S0 strobe come back on, or will it be someplace else in the timing cycle?

A Well, that strobe will come back on, because -- if you have a switch, and it was in front of this other switch, you could continually hit this one switch and make it process while hitting the other one; and as long as you kept hitting this one, it would keep processing it.

Q And that would effectively keep the strobe

from going to the next strobe -- I mean, the strobe would not switch from S0 to S1 if you kept doing that, right?

A That is right. That is right -- well, it would not process the other switch closure until it was completely all done processing these ones you were hitting.

Whether or not it picked it up, it would, if you had a score routine in that switch that you were continually hitting.

There is a problem, here, with talking about switch recognition and switch function, performing the switch's function.

A Right.

Q So if you keep hitting this switch, and hit another one, when you got done with this one, assuming it was scoring, it would then, after it was done with this, pick up this other one. (Indicating.)

What the strobes are doing in between for that short period of time, I do not know that I have ever looked at it on a scope and could tell you what happens between one strobe and another. I mean, you are talking about a small window of time, and I do not think I have ever looked at that.

So, to talk about strictly that little bit, you know, I guess I do not know.

Q Now, is there any interconnection or interrelationship between the strobe and the strobes that provide the scoring, and that is the 16 strobes, D1 through D16?

A You mean the digit strobes?

Q The digit strobes.

A Is there any interconnection?

Q Connection or relationship between those two, in view of the fact that you are sensing, as I understand your testimony, switch closures during the display of your updating of scoring.

A There is no connection between the two. The DS -- let's go back a minute.

We are talking about D1 through 16, right?

Q Right.

A The digit strobes.

That is handled solely by the GPKD, independent of anything else. It is not even determined by our programming. That is the nature of the chip. The chip is an intelligent chip; it does what it has been built to do, and the programming cannot change that, assuming you supply the clock to it and the instruction

data-buss, you know, the proper imputs. There is nothing more that needs to be done with that chip; it runs on its own.

The strobes that are put out as S0 through S4 on the matrix, that is definitely controlled by the software that is in there, and operates akin to what we have just talked about.

Q So the fact that the strobes interrogate the switch matrix during the score updating is a function only of the software program -- or, of the programming, I should say

A It is a function, yes, it is more a function of what is in here (indicating) --

Q Of the personality program.

A Yes. If you had a switch that was written to turn on and off a bunch of lights to make it kind of a sequence or like through a bonus routine or something, and never had any score in there, those strobes would never come back on until you ended up down here with a stop instruction.

So you could be hitting switches until you are blue in the face, and it would never recognize any of them, simply because you programmed this thing without any score instructions.

Meanwhile, the display strobes, they would be going on just like they have always been, keeping the displays there so you could see them. Of course, they would not be updating because the only way you can update the score is through a score instruction, which we said in this example we did not have.

Q Right. But, now, in a game like Cleopatra, you would have score instructions.

A For every switch on Cleopatra there was some score of one form or another associated with it, 10s, 50s, hundreds, five hundreds, five thousands, whatever.

Q And is that true on every commercial solid state pinball game of Gottlieb?

A As I recall, Cleopatra, Sinbad, Joker Poker, Close Encounters, for every switch there was at least some type of score associated with it.

Q And during those scoring updates, the switches would be sensed; is that right?

A Yes, the switches that are on the matrix would be interrogated.

MR. KATZ: Let's take a short recess.

(There was a brief recess, after which the taking of the deposition was resumed as follows:)

(The record was read by the reporter.)

BY MR. KATZ:

Q Is there a routine of some sort that would be required to be carried out in response to every switch on the playfield?

A I do not think I understand what you mean.

Q When any switch closure is sensed, would there always be something that the microprocessor had to carry out?

A Yes, sure.

Q Would there ever be any time when the system would read two switch closures into the RAM without performing any routine in between?

A I do not really know.

Q In the idle mode of the machine, let's say after the power-up and after the repeat button was pressed, the strobe signals occur with some regularity, is that correct, assuming no switches are being closed?

A If the ball is just sitting there in the shooter lane and it is in the game mode, or even in the game over mode, it does not make any difference, the strobes S0 through S4 are being outputted, and the processor is involved with looking at the return lines

to see if anything has happened. Otherwise, something could happen and you would miss it, like maybe a coin or something, which would be disastrous.

Q It is looking at all the return lines?

A Right.

Q And those strobes, 0 through 4, also go to the coin switches?

A The coin switches are on the matrix, which is part of the S0 through S4, R0 through R7 set-up.

Q So during that period of time, the strobes are running, say, S0 through S4 and back to S0, and during each of those strobes, the microprocessor is interrogating the return lines from the matrix.

A To see if anything has happened.

Q What determines that regularity? Is there a clock, or what determines the regularity of this operation?

A You mean from the time that strobe 0 first starts?

Q Yes.

A To the time that it next starts again?

Q Right.

A And we are assuming that nothing has happened in between?

Q Exactly.

A That time is determined by whatever the program statements are that comprise this whole routine, and that time is normally around 18 milliseconds, getting from S0 back to S0 again.

Q And the interrogation of the return lines is also, then, determined by statements in the program?

A Yes.

Q And are these in the personality program, or would this be in the background program?

A The statments that control the outputting of pulses on S0 through S4 and the associated looking at those return inputs, phi-8 through 15, those are all set up in the programming in the background ROMs.

Q Once there is a switch closure sensed, then is it your testimony that there would not be any regularity?

A The regularity from that point on is determined by whatever the microprocessor has to do in conjunction with that particular switch closure. Each case could potentially be something different, as far as this interval between when strobe 0, for instance, activates and when it next activates again.

Q And when it next activates after a stop instruction, or on a score update, is there any phase or time relationship which it must have with respect to that point in time

when it was on previously?

A Assuming that you have no other switches to pick up after it gets done with that first one, it will go back into what we have designated somewhat as the idle mode, in which case, if nothing happens again, you will find that S0 comes again after the first S0 by about 18 milliseconds, then S1 comes, then S2, S3, S4, and back to S0 again.

Q Let me ask you: Attached to these documents G1400 through G1410, which you said was a program listing for Cleopatra, I believe, they were attached, at least, on my copy, G1356, G1179, G1181, I would like to ask you if you recognize those documents.

A I have seen -- I have seen 1179 and 1181 before; I do not believe I have seen 1356 before.

Q Do you recognize who drew it or anything?

A No. It is not clear to me who might have drawn that.

Q What do you recognize G1179 to be?

A That item was sent to me in a package of information that I had requested from Rockwell; and when I got it, it looked like something from something else they were working on with somebody, some other company, because this does not apply to anything that

we were working on. So I figured that it was something that they goofed up on that probably I should not have seen, but I had no way of -- nobody said so one way or the other, but it was not ours.

Q Did you ever inquire as to what it was?

A I do not recall whether I did or not. It's, you know, fairly self-explanatory by looking at it.

Q It says "Figure 4 contact matrix assignment."

A Right.

MR. HARDING: Off the record.

(There was a discussion off the record, after which the taking of the deposition was resumed as follows:)

BY MR. KATZ:

Q Do you have any belief as to what this is?

A I have my own belief, yes.

Q What is that?

A I think it is the matrix of switch operations that one of our competitors set up with Rockwell in order such that if you put a switch in this position on the matrix, that it will always do that, and the same thing here and here and here. (Indicating.)

In other words, every position on the switch matrix is a dedicated switch. If you put a switch

at that location, it is forced to do exactly what it says here and nothing else.

That is what my belief is.

Q And who do you believe that competitor to be?

A Well, in my mind it was Williams, but I have no confirmation one way or the other.

Q Did you ever see a Williams machine that had that type of arrangement?

A Never did.

Q Do you know what this number at the top means, code identification number 34576?

A No.

Q And do you recall ever discussing this with anybody at Rockwell, G1179?

A No, I do not recall any conversation with them at all.

Q How about G1181; what do you recognize that to be?

A Oh, that is my writing of a bunch of notes that I made on certain games that we had produced in the past, electromechanical types.

Q And were you trying to define the number of lamps and solenoids that would be required for those

various games if you were going to make them in solid state?

A No. The point of intention here was that we wanted to pick a basic number of lamps and solenoids capability for control board and driver board, which would fit what we thought would be any game that we designed from there on out.

We had plans to make spare boards if we needed them, but we wanted to not do that if we could help it.

And by looking at past games, we hoped to get an idea of what future games might call for, and thus come to some kind of semi-accurate figure as to what our maximum capability would be, because we did not want to put a lot of things on there we never used; that was expensive, and we did not want to undercut ourselves, either.

So it was hoped by looking at the past, we could come up with an indication of capabilities for number of lamps and solenoids for additional games that were to be made.

Q I show you now again G1400 through G1410, and you indicated you recognized that software program for the Cleopatra.

Did you have anything to do with the preparation of this document?

A I had the job as overseer on it, to make sure that the programming that was on here was what we wanted; and I also, as you can see, made some notes on it, too, for my own benefit.

Q This is your handwriting on the right side?

A That is all my handwriting, right.

Q And when was that originally prepared, do you know?

A Well, there are three dates on here, but I cannot really tell you.

Q Was this prepared at Rockwell, as far as you know?

A Which part of it?

Q The original underlying document.

A The typed --

Q The typed.

A The typed stuff?

Q Right.

A Yes, that came to me from Rockwell in the typed form that is presented here.

Q And do you know, can you tell about when you received it initially?

A No way of knowing.

Q What is the significance of these dates, 8/4/77, which has an X through it, and 1/10/78?

A Well, some changes were made on 1/10/78 that were reflected in the date being changed from 8/4/77.

Q Do you know if any changes were made in the Cleopatra after that date?

A After what date?

Q 1/10/78, in the programming.

A Not that I recall.

Q Is this the program listing, the personality program, for the Cleopatra?

A Yes.

Q And it is written in PGOL language, pinball game oriented language?

A Right.

Q Would there be a similar document to this for subsequent games to Cleopatra, but with the personality programs for those respective games?

A There would be personality programs written in order to generate the personality PROMs.

Q What were the additional program listings or materials on the last page?

A That was thrown in there for -- well, I

threw it in there. We had at the time a playboard simulator, a piece of test equipment, that was being manufactured by us for people on the outside so that they could get into solid state a little more easily than just by jumping in; we hoped that this would be a tool to familiarize themselves with at least some of the goings on.

Q You mean for servicing?

A For servicing, right, and for troubleshooting.

What I did, here, was took the extra space that was in the PROM, and by using a different switch matrix point that did not exist in the game, but that existed on the playboard simulator, I was able to turn on solenoids 1 through 8 and lamps 17 through 36 so that he could hit this button and get a quick indication visually that the lamp drivers were working and at least that most of the system was working, because if it got to this point, there had to be an awful lot of things right, couldn't be very much wrong, or else it would have never gotten this far.

Q I show you a document that was produced by Gottlieb's counsel under production numbers G1200 through G1206, and ask you if you are familiar with that document?

A Yes, I am familiar with it.

Q And what do you recognize it to be?

A It is a product description for the Gottlieb game control system.

Q For any particular game?

A Only as spelled forth by what it says in relating to a specific game.

Q Did you receive that from Rockwell?

A Yes, I did.

Q And did you have anything to do with its preparation?

A I was at least involved on reviewing it and seeing if everything in here was according to -- well, my understanding of what things we wanted.

Q Do you recall, or can you tell from that document about when you received it?

A It has a date on it, but I do not know whether that date has -- what date I might have received it in relation to that date.

Q It is dated April 8, 1977, and has the name J. W. Footh on it; is that right?

A That is what it shows.

Q Did you ever have occasion to use this document for anything?

A I guess only in making sure that their thoughts were the same as my thoughts as far as the game control

system was concerned up to the point in time that it was talking about.

Q I show you a document marked GO511, and ask you if you recognize this document?

A No. It is not one of my documents, I do not recognize it.

Q Do you recognize the handwriting?

A No.

Q Do you recall any discussion or consideration with respect to changing scoring like the scoring on any Bally pinball machine?

A Is that in reference to one of the points there?

Q Yes.

A Could I see what it says?

Q Sure. Some if it is hard to read.

A Yes, I know, that is why I am trying to figure out what you mean by your question.

Q It says: "What about switch something," and it looks like it is illegible due to the copying.

MR. KATZ: Do you have the original of this, GO511?

MR. HARDING: (Indicating.)

BY MR. KATZ:

Q Switch box? Switch bounce: "What about

switch bounce."

MR. HARDING: Do not speculate if you --

BY THE WITNESS:

A I really -- it is hard to read what this is. I do not know exactly what the note "What about switch whatever" pertains to; and, "change scoring like Bally," I do not know what that means, either.

Q Does it prompt your recollection as to any discussion about the subject matter?

A Well, we have talked before in previous time, here, concerning the scoring changes we made concerning remembering switch closures or not remembering, like electromechanical and solid state, that kind of thing. We have discussed that before.

Whether or not this pertains to that or something along those lines, I really do not know. There is not enough detail there to know what it is referring to.

Q Do you recognize this handwriting as Wayne Nyens'?

A Are you asking me?

Q Yes.

A I cannot honestly be sure. I do not know.

Q Let me ask you if you recognize this document

G1097?

A Yes.

Q And whose writing is that?

A That is mine.

Haven't we been over this before?

Q I hope not.

A I do not know, maybe not.

Q I am trying to avoid any duplication.

A It just seems like we are going back in time again with the date and all.

Q Well, we had covered a certain period, but we -- I am trying to cover the remaining period during Cleopatra.

What was the occasion of your preparing that document?

A Well, basically it lists about ten different items that were -- either had questions about them or made notes on them concerning some kind of discussion that we were involved in with Rockwell at the time in the development of the first Cleos.

Q Were those notes made by you in connection with an examination of a machine or discussion with anyone? Can you tell?

A Some notes were written based on an examination,

and some were written based on possibly discussion, and some could have been both.

Q Where it says here under date 4/14/77 -- there is a point, it says: "Bally game shipped? Big display shipped, yes," and it says 4/12/77.

Do you know what was meant by you when you wrote "Bally game shipped?"

A That referred to the game that they had out there that we have mentioned in previous discussion. I do not remember the name of it offhand, but --

Q Freedom?

A I think that was it, whatever we talked about before. We have been over that, I think.

Q I show you a document that was produced as G1174, which appears to be some kind of form of Rockwell International addressed to you and Mr. Nyens. Do you recognize that?

A Well, when you say recognize, I am not sure whether I saw it before or not. I can read what it says.

Q Do you know what it relates to?

A Well, just what it says. It talks about two prototype systems consisting of blah, blah, blah, and it looks like some kind of invoice that they sent

to our company.

Q And it is dated -- has a date shipped of May 27, 1977.

Do you know what game prototypes these were that were shipped?

A Well, these were, according to this document, these were prototype systems, and our prototype game was Cleopatra, our first game was Cleopatra. So -- well, at that point in time it was --

Q It would have been Cleopatra?

A It was intending to be Cleopatra, yes.

Q And I show you documents that were produced as G1198 and G1199, and ask you if you recognize these notes as being yours?

A Those are mine.

Q And did you prepare those notes on or about June 4, 1977?

A Yes.

Q What was the occasion of preparing those notes?

A Well, I think they came about because we did some evaluation on a game and made notes on what we found.

Q Was that an evaluation of the Cleopatra prototype?

A Yes

Q And were those your comments on the evaluation?

A Yes. I am sure I have seen that before here.

Q There is a comment on the second page on G1199; your note says: "Like Bally's way of paying up the line." What did that refer to?

A Okay. When you beat high game to date, you would get three free games if the adjustment was set that way.

Let's say, for purposes of argument, that the high game to date, up to this point, was 500,000; let's say we are playing four players: If the first player got 510,000, and the second player 520,000, and the third player got 530, and the fourth player got 540, everbody did, in fact, beat high game to date, because it was 500.

Well, the fourth player actually had the high game to date as it stands now, but since the first player beat it, and then the second player beat the first, and the third player beat the second, and the fourth player beat the third, each of those guys would get three free games, or a total of 12 free games. In other words, we paid up the line, looking at player one, first, two, three, and four.

Q What did it have to do with Bally?

A Well, that is the way they did it on their -- that was the way that their feature was set up on their game.

Q Did you ever have occasion to examine that on a Bally game, that feature?

A The feature? Yes, yes.

Q And what was the purpose of writing this note, "Like Bally's way of paying up the line"?

A Well, instead of describing what I just described, it was easier to make a note like that that would, you know, trip what we wanted as far as the feature was concerned, rather than trying to describe all of that out.

Q And who was this note to?

A Nobody in particular. It was my note.

Q Note to yourself?

A Yes. It was not addressed to anybody.

Q Was it for a purpose of discussing it with Rockwell in the design of the Cleopatra or some other solid state game?

A Yes.

Q I show you a document G1098, and ask you if that is also in your handwriting?

A Yes.

Q Do you know when that was prepared?

A No date on it.

Sometime during prototype development.

Q What was the occasion of preparing this document?

A Make more notes on things that had to be discussed or firmed up or reviewed or whatever.

Q There is a note, 4, which says: "Switch matrix capability reduction." Do you recall what you meant by that?

A Why, at one point in time we were going to go with an 8-by-8 type of set-up, and we reduced that to 5-by-8, because, well, save money.

Q And the Cleopatra and the subsequent solid state commercial pinball games of Gottlieb did have the 5-by-8 switch matrix, right?

A Right.

Q These playfields that are listed, were those electromechanical playfields?

A Yes.

Q I show you documents G1210 through G1213, dated June 8, 1977, which appears to be, and I believe has been identified to be, previously, a copy of a letter from Wayne Nyens to Mr. Robert Browning of Rockwell

International which contains certain handwritten notes, and I ask you if you can identify those as being your writing?

A Yes, the notes are mine.

Q What was the occasion of your putting those notes on that document?

A The occasion was, the letter states that -- let's see, what does it state.

Okay. Upon review of a game that they wanted us to look at to see if they met all our specifications we noted certain discrepancies that we have pointed out in this letter. It reflects discrepancies and changes that we decided to make ourselves, specification changes in the way we wanted things to operate.

Q When you marked "Okay," what did that mean, next to each item?

A Well, that indicated that whatever was noted as being a change or a correction was, in fact, taken care of.

This particular note, for instance, 7A -- yes, we looked at the game, they made some changes, corrections, we looked at it again, and note 7A happens to be one of those that was not written down until the second time that we went there, or wherever we looked

at the game. I do not know whether it was there or here or wherever. And that is why it does not have an "Okay" next to it. But it is part of the letter and the notes that were made.

Q And do you remember when that occurred with respect to the June '77 date?

A Somewhere around that time frame.

Q Somewhere after June '77?

A Or June '77.

Q I show you a series of documents marked G1197, G1196, and G1195 -- they are in reverse order because the dates go in the opposite order -- dated June 20, 1977, June 21, '77, and June 22, '77, and ask you if those are your notes made on or about the date that they bear?

A The handwriting is mine, that is for sure.

Q And what was the occasion of making those notes?

A Again, it was to point out things that we needed on our system and that apparently were not in it at the time that these notes were made.

Q And were they made on or about the dates that they bear?

A Yes.

Q Were you out at Rockwell at the time you made those notes, as far as you can tell from those notes?

A Yes.

Q And was that also in relationship to the Cleopatra prototype?

A Yes.

Q Now, we saw a shipping statement or invoice before, dated in May, of two prototype systems which you thought were Cleo prototypes.

When you were out at Rockwell subsequently, did you have that prototype or the same or different prototype back out there?

A I do not really know exactly.

Okay, these refer to the boards for the system along with two sets of schematics for the system.

Q That is G1174?

A Right. We got the boards to verify that the schematics and the hardware was right.

These boards were going to go into the first production prototype samples, the first two of the first twenty when we got them built and when we got everything finalized with the background routines

and all of that.

These were not, at this point in time, 5/27/77, these were not incorporated into the games at that point, because obviously from these notes we were still making changes to the -- well, that original first prototype --

Q That they still had?

A -- which we worked off of.

Q And they still had that at Rockwell in California?

A And they had it at that particular point in time.

Q June of '77, late June.

A Yes. And that thing had been back and forth, as we have discussed in times past, at different times.

Q I notice that shortly -- I think that last date was June 22, '77 -- there is another document, G1175, which has a date at the top, June 22, '77, and is signed June 23, '77, relating, apparently, to some shipment.

A Yes, I would agree with that.

Q Do you know what that relates to?

A Just what it says. They sent us a control board, a driver board, and a four-digit display panel.

Q Do you know what was done with those?

A Well, it was not necessarily that anything had to be wrong; it could have been that -- in the process of making printed circuitboards, you make the first ones, and then usually you have to go back and make minor corrections, either for aesthetics or maybe parts being added, or just a general re-layout of the thing to make insertion easier, things like that, along those lines.

Whether or not this was done for that reason, it is possible. I do not have any way of knowing for sure.

The bottom item, though, that four-digit display, was something that we were going to later, because the prototypes that we had talked about, and the documentation that talks about that status display, was, at first, originally a five-digit display, and we told Rockwell that we were going to a four-digit display for games after 409. That has been reflected in the paper work that you have already shown me and are aware of.

Q I show you, now, document G1228. It says: "Bruce Amusments, July 1, '77," and then it says, "Bally solid state problems."

I ask you if those are your notes?

A Yes.

Q Do you know when this was prepared?

A 7/1/77.

Q And who is Bruce Amusements?

A Bruce Amusements is an operator out in New Jersey that our company, of course, is familiar with; he buys Gottlieb equipment.

He has had a history of being one of these guys a company can talk to. You know, if anything goes wrong, Bruce will tell you about it, no matter what it is, politics, religion, or whatever, Bruce is the guy that you can talk to and get opinions on things. And this particular document refers to the point in time when he was telling us about some of the problems he had experienced with his Bally solid state pins.

Q And were you instructed to collect that information from Bruce amusements?

A I was not instructed to collect it. Bruce happened to call and wanted to talk to people, talk to someone. You would have to know Bruce, I guess.

He wanted to make our company aware of his thoughts on the subject, and I -- they asked me to come in and be involved with what he had to say

to see if it -- you know, to learn from it.

Q Did you go out to see him?

A No.

Q How did you get this information? Over the telehone?

A Right.

Q And you made this list from his information?

A Right.

Q What is Evel Knievel? Do you know what he meant by that; is that a Bally game?

A Yes.

Q A solid state game?

A Yes.

Q Was that a home game or coin-operated game?

A Well, this game he was talking about, I am sure it was the commercial game, because he was an operator and he was in the business to make money, and you cannot do that with a home game.

Q And Jet Spin, is that a solid state --

A Gottlieb.

Q -- Gottlieb game?

A Yes, electromechanical -- did you say solid state?

Q Yes, I said solid state.

A It was electromechanical, Jet Spin.

Q Jet Spin was electromechanical?

A Electromechanical Gottlieb.

Q And was he comparing the solid state Bally Evel Knievel with the electromechanical Gottlieb Jet Spin; is that what --

A I do not know that he was. Any comparison that might have been brought about was just used by him to further some kind of a point that he was trying to make.

The comparison was his, not ours. We did not ask him to do any comparing.

Q What did you mean by this?

A I do not know. What does it say?

Q It says 3-ball versus the Jet Spin 5-ball.

A Evel Knievel versus Jet Spin, two coins for three plays -- he was telling us how much -- how good his games were doing, Evel Knievel versus Jet Spin, as far as collections were concerned, and this information was that his Evel was set on 3-ball and Jet Spin was 5-ball, and both games were set up for two coins for three plays.

Q And what was the next; what did you mean by this: "Like noise and song and dance"?

A I think Bruce liked the little ditties that the Evel Knievel played when you completed different things like bonus, double bonus.

Q And he said Knievel beat Jet Spin two to one. He is talking about money collections?

A Yes.

Q And he says "Few problems." What did you mean by that?

A It refers to that he was having few problems with his Bally games that he had.

Q And then 5 is "Have Atarians out." Was that the Atarians, the solid state game that Atari came out with?

A Right.

Q It says, "They like Bally's." Do you know who you meant by "they"?

A Bruce and his boys.

Q "They hate magnet rollovers": Is that the switch system that was used in the Atarian game?

A Right.

Q "Dislike scoring in playboard": Was that also a feature of the Atarian game?

A "Dislike scoring in playboard": I am not sure what that refers to exactly, I do not remember.

Q Point 6 is, "Like Interchangeable display." Do you know what you were referring to there?

A Yes, every display was the same as every other between, you know, players and the status display, so that if one burned out you could steal another one for the time being and use that one.

Q And all the rest relate to the same sort of thing?

A Yes, notes made on his comments.

Q And did you ever communicate this to anyone, this list of points?

A Yes. There was -- Wayne was involved in the same conversation when I made those notes; he was sitting there listening to it at the same time.

Q Was this generlaly considered as input in connection with the design of your solid state games with respect to what were good features and what were bad features?

A Well, I do not know what they considered it. I had my own thoughts on it: If somebody has something to say, you listen to it, and if it has any merit, you think about it; if it does not, well, you think about it, too,but, you know, you evaluate what is being told to you, and do whatever the situation calls for.

Q At the bottom, here, the last point, it says, 16: "Should have made Jet Spin a solid state game." Was that his view?

A Yes. He thought Jet Spin would have been a tremendous game if it was solid state.

Q There are another set of notes produced under numbers G1165 -- they are not in order -- G1162, G1163, G1164, G1166, G1167, G1168, and G1169.

I ask you if you recognize these notes at all?

A These are notes made of certain things that I had questions about or communications with Rockwell about, or --

Q Those are your notes?

A Yes, these are my notes.

Q Can you tell from the notes generally the period in which they cover?

A Well, there is a date on the one of 7/12/77, and 8/10/77, and 8/2/77, so it was right in that time frame that these notes were written down.

Q And what was this -- some of it is cut off, but perhaps you can still read it -- this portion here on the first page, G1165, that starts out "Stern."

A "Stern Electronics working with Universal

Research; they are making immediately Chinese copies of the Bally system. Schedule says that they will be ready for the AMOA Show; Bally is completely changing their systems so I heard, but they made a verbal commitment to the operator saying they will stick with the system for five years; Midway says cost reduce using the Z80." Midway was being directed to use the Z80 because of the cost reduction by Bally. All of that was from a telephone conversation I had with Rockwell. They told me this information for what it was worth, that they had heard it.

Q Who was that at Rockwell?

A To the best of my recollection it was John Footh.

Q Do you know if they had any relationship with Universal Research or Stern Electronics?

A To the best of my knowledge they had no relationship whatsoever.

Q Or whether they were doing work for them or Universal or Stern was doing work for Rockwell?

A As far as I knew, there was no connection whatsoever between Rockwell and those two other parties.

Q On one of these other pages, G1164, there is a note that says, "Can't change RTN0 switch designations?

Fixed in background."

What was that; what did that mean?

A Okay. We have in our games, the operating manuals, I think, show this, or the service manual, I do not know which, return zero; for each of the different strobes on return 0, we have a set switch for that function. It is the same in all the games. Strobe 0 is the play test switch, strobe 1 is the first coin chute switch, then the second coin chute switch, then the replay button, and then the tilt switch. All of those are constant, and there is no way that we could change the function of those or change them around in the matrix as far as what position they were at; they were dedicated switches because they were used in every game and they had the same function in every game, so there was no reason to make them variable.

Q So that was fixed in the background program in the A-17 chip?

A Yes. By fixed, it means that we could not touch it, it was a constant; not that it needed to be corrected, okay?

Q Yes.

A It was a constant, and we could not touch it; we did not have any control over it.

Q You could not change it with your personality

program; it was always going to be at those positions?

A Right, we could not make the replay button any other point on the matrix from what it was.

Although, if we wanted to, we could have made a second replay button, but that would be kind of wild. You hit a switch on the playfield, and it gives you a coin.

Q I show you a document, G0377, which has, I believe, some part expunged, and ask if you recognize that document?

A No, have never seen it.

Q Do you know whose handwriting it is?

A Yes, that is Wayne Nyens'.

MR. KATZ: Are you still maintaining this expungement?

MR. HARDING: If I recall, Mr. Katz, I showed you the original of that document.

MR. KATZ: During Wayne Nyens' deposition.

BY MR. KATZ:

Q I ask you if you recognize G1172?

A Yes.

Q What do you recognize it to be?

A Well, they sent us some spare parts for those prototype boards, that they either had sent us or were

going to send us in case we blew them out or they did not work right.

Q Was this for the Gottlieb prototype Cleopatra?

A Yes.

Q I show you a document marked G1171 and ask you if you recognize that?

A Yes.

Q And what do you recognize that to be?

A Well, that was a little header that they made up to interface to our control board to adapt to one of their test fixtures that they made available to us.

Q Did you get this from John Footh?

A Yes.

Q And this document is dated August 29, '77.

I show you a document marked G1170. Do you recognize that as your handwriting?

A That is mine.

Q What is that document?

A That describes the functions that we wanted for test fixtures, for each of the different boards.

Q And item 1 says: "Display board multiplex digits on bench."

A Well, in testing a display board, all you

had to do was light up the, you know, the digits, and make sure that all the segments were working, all the digits were working; and if you built a tester that multiplexed the digits, that would accomplish the purpose.

Q And at that time --

A In fact, their tester also did that, it multiplexed the digits on the bench. They provided the first little tester for us, for the display boards.

Q And were the people from Rockwell there at Gottlieb at that time?

A That is what it says.

Q August 31, '77. And do you recall who was there from Rockwell?

A No.

Q I show you a document, G1091. Those are all your notes?

A Yes.

Q Were those made on or about September 13, '77? Were you at Rockwell?

A I do not really know. It could have been a telephone conversation just as easily.

Q Do you know what those notes relate to?

A Test fixtures again.

Q Where were you with respect to production

of the Cleopatra at this time?

A When was the date?

Q September '77.

A Well, we had sent out our 20 production prototypes, and they were out in the field, or soon to be there, depending on traveling time, of course, and we were gearing up getting ready for production which was to follow sometime later.

Q I show you documents produced as G0512 through G0516, and ask you if you recognize this?

A Yes.

Q What do you recognize it to be?

A It is the game description of Cleopatra; it tells how it operates.

Q And do you know when that was prepared?

A Not exactly. It would have been the summer of '77, June, July, August.

Q And who was this prepared for?

A In-house people. It is a standard procedure to write up a game to tell how it operates so that whoever wants to know and needs to know can find out right away without having to figure it out from the game.

Q These are sort of game rules?

A Right, tells how the game is to be played;

and they use that in writing their instruction cards, operating manual, and everything else. That is the gospel for the game.

Q Do you know if this was actually used for the manual that we went through?

A Sure, parts of it. It is not written word for word, but the basic outline of how the game is to be played comes from that.

Q And would there be one for subsequent games to Cleopatra, similar type of document?

A Yes.

MR. KATZ: Let's take a short recess, I think I am pretty well near the end.

(There was a brief recess, after which the taking of the deposition was resumed as follows:)

BY MR. KATZ:

Q Let me ask you about this document, G1227, which is a very faint document, and I bring it up because it also relates to the Evel Knievel versus Jet Spin. It is barely legible, G1227. Maybe you can see it.

MR. HARDING: I take all those comments, Mr. Katz, to mean that you would like to see the original

if I have it.

MR. KATZ: If you have it, yes.

BY THE WITNESS:

A That is not my writing.

BY MR. KATZ:

Q Can you tell?

A Sure. My writing is bold, decisive; this writing is light.

Q Do you know whose writing it is?

A That looks like a copy, too.

Q Does that look like Wayne Nyens' writing?

A I would not hazard a guess on that. That is what it would be, is a guess. It does not strike me as Wayne's writing, no.

Q Does that relate to the same conversation?

A Yes, that is the same conversation, because it talks about the noise, the 3-ball, the 5-ball, the coinage, it talks about the main disadvantage being parts availability, which mine also had. It is the same conversation.

Q Who else was in on that conversation, do you remember?

A I do not remember. I know Wayne was for sure. I do not know who else.

Q Was that a meeting, a face-to-face meeting, or telephone discussion?

A It was in his office, he has got a speakerphone, you know; we piled in there and we usually, you know, whenever we get together, it is in his office for a telephone conversation, and sometimes there are a few of us, sometimes he and I.

Q You do not know whose notes these are?

A No. I do not want to speculate, and it is not clear to me at all.

MR. KATZ: Wayne, could you tell me -- and I would like to have you make a statement on the record -- of what these documents are that you produced?

You produced two sets: One are copies for us, numbers G2107.0 through G-- I guess they are not in order --

THE WITNESS: They are, but there are four different G numbers, all decimal pointed.

BY MR. KATZ:

Q One is G2107.0 through G2107.12, G2108.0 through G2108.4, G2109.0 through G2109.4, and G2110.0 through G2110.4; that is one set, and those are our copies, plus G2100 through G2106, and those are produced in response to what request?

MR. HARDING: I believe that you had requested from Mr. Lynch and myself everything pertaining to any changes which have ever taken place to date in the Gottlieb solid state game.

We took that to mean both from Rockwell's files and from Gottlieb's files. So we have completed our reinvestigation of the Gottlieb files and have come up with these additional documents which may have already been produced previously, or may not, I do not know. But, because they bear later dates -- by "later," 1978-type dates, and some '79 -- they are being produced to you in honoring your request.

MR. KATZ: Do these relate also to the reasons for any changes?

MR. HARDING: Yes, as far as I know.

Now, the file that we produced for inspection only is being produced because it pertains remotely to the electronic aspect of the Gottlieb game; the patent is not directed to power supplies, and I do not know whether you are interested in power supplies. So, in accordance with our earlier local rule conference understanding that you were not interested in anything that did not pertain to the solid state portion of the game, it was not produced initially. It is being produced

now in case you want it. If you want to make copies, fine; otherwise, fine.

We will point out certain of the legends on those documents indicate they are proprietary to a company and warn against photocopying.

MR. KATZ: Do we have permission to make a copy of those?

MR. HARDING: You do.

MR. KATZ: For completeness of our record we will make a copy of those documents and keep them with our record files.

MR. HARDING: I cannot give you permission; I mean, they are OPT legends on them, that say they are OPT drawings and not to be made copies without express written permision, which I do not have. So you may make copies at your own risk and discretion.

BY MR. KATZ:

Q Were any changes made in the Gottlieb pinball control system between June of '78 and the present time?

A Yes.

Q Do you know what those changes are?

A Oh, they involve little things like resistor value changes and capacitor-type changes from one manufacturer to a different manufacturer because of

supply problems. That has been basically it.

Q Do you recall any other types of changes?

A Well, we changed from the 5-digit display to the 4-digit display on the status display after Cleopatra.

Q Do you recall when that was? Was Cleopatra the only game that was otherwise built?

A With the 5-digit?

Q With the 5-digit.

A Yes.

The power supply, which I guess you are not interested in, had some component changes in it.

Q Does Gottlieb supply or construct its own power supplies?

A Those supplies that were constructed for Cleopatra were provided by Adtech Power.

Q And how about for subsequent games?

A Subsequent games, we also used OPT as a supplier of power supplies.

Q Were any of the resistor changes made or any other component changes made to correct any problems in connection with the game?

A Well, there was one resistor change that involved changing the level of a pull-up resistor so

that the interface was better between the PROM and the CPU through the PNP transistor. That is all I can think of.

Q Were any of these changes initiated by Rockwell?

A Yes, that one was.

We also moved the position of the 10K; it is the discharge resistor, the space charge resistor on the 6-digit display. We used to connect it, I think, to ground, and now we connect it to -- I do not know, it is in the drawing -- some other point. So we moved the reference where that was.

Q You mean to some --

A Upon Rockwell recommendation.

Q -- to some voltage above ground, you mean?

A I think it was.

Q Can you tell by looking? I can give you the schematic if you want it.

MR. HARDING: I think, Mr. Katz, that the documents that I produced this morning were Rockwell documents which you may already have had. Those documents may be relevant to this inquiry, if you would like to show the witness those documents.

BY MR. KATZ:

Q These documents; and then there are the documents

from your file. (Indicating.)

A Oh, those power supply ones?

Q Right.

A Well, that was nothing --

Well, this does not say. But the change in the displays was from moving the 10K resistor between that space charged pin on the display and ground, and I think we changed it to put it to 60 volts instead, or vice versa. It is one of the two. It was a real nothing as far as having anything to do with patent and lawsuits and anything else.

Q Do you recall when that was?

A Oh, boy, I do not know. I do not have any idea. Sometime after Cleopatra.

And then we changed some fuses, changed some tooling on the light box vent panel, changed a connector on the power supply so that it would not be able to be put in upside down, we had to key it.

That is about it, I cannot think of anything else.

Q Do you recall any changes made in the power-up circuit, PO?

A Yes.

Q Do you recall what those were?

A We took off a resistor -- we took off a pull-up resistor that was pulling up. There is a story behind that that would not affect you any, but it was a resistor that was thrown in there that was supposed to be pulling up, but it was not doing anything, so it was a waste of a part.

And I think there was a component value change on one of the resistors to provide a little more current to the PO pin on the processor; and there might have been a resistor change also to increase the length of time that the pulse remained on.

There was some kind of service bulletin put out, I think, by the company that describes that.

Q That change?

A You know, a little sub-system part of it. Offhand, I was not involved with much of that because -- well, that was something between, like, you know, the service department and the higher-ups.

Q Who was responsible for that, Rockwell, that change?

A For the change? Well, it was a kind of a joint thing, like everything we worked on was throwing ideas back and forth, testing it, each of us, and coming to a conclusion, and then we decided that whatever was

done was better; and so, because of mutual agreement, it was done.

Q What kind of connection do you have if any with production at the present time?

A Right now, as of today?

Q Yes.

A Not too much: If and when they decide that they want to involve me, otherwise they do not tell me anything.

Q Do you have any understanding as to what the subject matter of the suit is about?

A As to what the subject matter of the suit is? What do you mean exactly?

Q What the nature of this lawsuit is in which you have been giving your deposition.

A Well, my understanding is that we are being sued for patent infringement for some reason.

Q And have you ever had occasion to see a copy of the patent in suit, that is involved in this suit?

A I saw a piece of paper, I think it was only two pages, that had like a column on it, column between the two pages, that described something or other about a patent, and it mentioned some guy's name. I am not sure I remember the name that was written there.

I read through it, and it did not make much sense, frankly.

Q If I show you a copy of this, which is the patent in suit, would it look familiar to you?

A Okay, I have seen parts of this before. There was also another little thing that I saw, too, in addition to this.

Q That you were referring to before?

A Yes.

Q Do you know where that is now?

A No.

Q What was the occasion of your seeing it?

A When all of this stuff first came up, somebody presented me with something and says, "Here, here's a little bit of background," or words to that effect, and so I looked at it.

Q Did you ever have occasion to read that patent?

A This one?

Q Yes.

A As best I remember, I looked at all the pictures, started to read what was in it. I do not know how far I got, but I kind of threw my hands up in the air and said, "What the hay," and that is about the extent of it.

Q Do you recall when that was?

A A long time ago, not recent.

Q A year ago?

A This is '79; when was this thing filed?

Q June '78.

A Yes, it's been probably at least a year.

Q And have you ever had any occasion to see it again since that time?

A No.

Q Did you ever have any discussions with anyone other than counsel concerning this lawsuit?

A What types of discussions?

Q Any discussions.

A Well, you know, we discuss, we talk to each other at work: "Hey, Bally is suing us." "Yeah? Why?" "I do not know why." "What do you think is up?" You know, that kind of thing.

But as far as, you know, what -- over and above that, counsel has been the people that I interface with.

We know certain rules: We are not supposed to talk with other members who have been deposed or who have yet to be deposed. Just what counsel tells us to, you know, the rules of the game, and that is it.

Q Have you had any discussion with any of the people at Gottlieb concerning your depositions?

A Just on the order of, "Hey, do you get deposed again?" "Well, I do not know." "Are they going to call you?" "I guess so." Just that sort of thing.

Q You have not discussed the subject matter of your testimony?

A No subject matter whatsoever, no way.

Q And you have not discussed the subject matter of the testimony of Wayne Nyens?

A Not at all.

Q Or Mr. Weinberg or Mr. Gottlieb?

A No.

Q Have you discussed the subject matter of your testimony or of anyone's testimony with respect to with anyone at Rockwell?

A No. That is just between Wayne and myself.

Q The relationship that you have with Rockwell, that Gottlieb has with Rockwell, you talked about discussing problems essentially jointly. Does that continue today in connection with developments or manufacturing problems and so on, relative to the pinball machines?

A If there is a problem that comes up in manufacturing that the people who are more involved with that than

I am, now, think ought to be carried to my level, and if they suggest, and if I think that the problem necessitates a call to Rockwell for whatever reason, then I feel free to be able to do that; but, it basically comes from, you know, from outside sources now. It does not come, I mean, from me. Unless I hear about something, I do not have any reason to get in touch.

If things are working fine, there is no reason to upset the apple cart.

Q But when you do have a problem there are discussions; is that correct?

A Oh, sure; got to solve them.

Q And did you ever discuss improvements in the system with anybody at Rockwell?

A Well, other than things that we see and come up with in production, like resistor changes and if Rockwell wants to make a manufacturing change in stuff that they supply us, like that type of thing would be with respect to one of these notes in this bulletin about the way that they mount the power transistor, or if they want to substitute a different source transistor that may not be able to take as much heat as the one they are presently supplying us, I get involved with that because it is a technical aspect and has to have

a technical decision. So I get involved with things like that.

Q Do you have any understanding as to the scope of coverage of the patent that is in suit?

A The scope of the coverage?

From looking at it, it applies to microprocessor pinball machine, I think.

Q Have you ever been instructed to attempt to design a different system to avoid any patent problems?

A What do you mean, "different system"?

Q Some system other than the one that we have been discussing in the Gottlieb commercial solid state pinball games.

A To avoid patent problems?

Q To avoid problems with patents.

A Well, I am not sure that I understand what kind of problems -- all the different kinds of problems we have now with our present system as related to this patent, because I am not completely, a hundred percent aware of, you know, everything that the patent says, you know, why we are being infringed, which particular areas, if it is only one or two, or the whole thing, or the general idea of putting in displays and switches and a processor, so I do not know what -- I am unclear

as to --

Q Well, have you ever considered design changes to avoid patent problems in any way?

MR. HARDING: You are talking about this patent in suit, Mr. Katz?

MR. KATZ: This patent in suit, yes.

BY THE WITNESS:

A No,not as relating to this patent in suit.

BY MR. KATZ:

Q In relationship to any patent?

MR. HARDING: To the extent that it calls for any patent other than the one in suit, that is completely irrelevant and I object to the question.

BY MR. KATZ:

Q With respect to any patent relating to solid state pinball machines.

MR. HARDING: It is still irrelevant. If Atari has got a patent or Williams has a patent that Gottlieb is concerned with, is entirely irrelevant to this lawsuit.

MR. KATZ: Could I have my question and his answer back.

(The record was read by the reporter as requested.)

BY MR. KATZ:

Q Are you aware of anyone else at Gottlieb that was instructed to attempt to design a modification of the system or some other pinball control system that would avoid a problem with the patent that is in this suit?

A Not to my knowledge.

Q Are you aware of anyone at Rockwell that was instructed to or was considering a pinball control system design to avoid the patent that is involved in this suit?

A No.

MR. KATZ: I do not have any more questions. This concludes the deposition of Mr. Edwall.

MR. HARDING: Are you going to offer us a chance to cross examine him?

MR. KATZ: Well, yes. It is the end of my questioning.

MR. HARDING: We do not have any cross examination.

MR. KATZ: We are producing documents relating to changes; these are documents relating to changes in connection with the Motorola parts, reflecting the reasons for changes and changes in the Bally coin-operated system, pinball machine control system.

They are documents number 2128 to 2158. Now, I know that they are stamped with the confidential stamp.

MR. HARDING: That was before the order?

MR. KATZ: And I will tell you that we will review those and we may remove those shortly.

Some of them do have handwritten notes.

MR. SCHNAYER: That was the reason why that was done.

MR. KATZ: Because, these are from Bally's files.

MR. HARDING: But, of course, the handwritten notes have to rise to the level of protectable information before --

MR. KATZ: Well, these are copies for you.

MR. HARDING: Mr. Katz, may I find assurance that the scope of the documents that you are handing to me, now, is indicative of the scope of the request for Rockwell's documents?

MR. KATZ: Yes, as far as I know, that is correct.

Is that correct?

MR. SCHNAYER: Yes, that is correct.

MR. KATZ: I am informed that there were

very few changes made, and they are reflected in these documents. I think they are primarily just some parts substitution, number substitution.

MR. HARDING: Okay. I see no power supply-type documents; does that indicate -- and the fact that we have not received any power supply documents ever from Bally -- does that indicate that we were correct initially that power supply did not need to be produced in the litigation?

MR. KATZ: Yes.

MR. SCHNAYER: I would tell you that those are produced, of course, under protective order and they are for your eyes.

MR. HARDING: Until the Judge has entered one -- has he signed an order yet?

MR. KATZ: I do not know.

MR. SCHNAYER: We checked it. But,as I am saying, those are documents that are produced for you; that is what I am saying.

MR. HARDING: Until the Judge has entered his order.

AND FURTHER DEPONENT SAITH NOT.

I have read the foregoing transcript of my deposition consisting of pages 1 to 808, inclusive, and the same is a true, correct and complete transcript of my said deposition as it now appears, so given at the time and place aforesaid.

_____

Allen Gene Edwall

Subscribed and sworn to
before me this _____day
of _____, A.D. 1979.

_____

Notary Public

My commission expires:

_____